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Molding Cast-Iron Tunnel Linings

Manufacture and Inspection of Segments for New York at Wheeling Mold & Foundry Works—Machine-Made Molds and Cores

BY LOUIS J. JOSTEN*

The manufacture and inspection of the cast-iron tunnel rings for the New York subway system for the East River crossings are now in progress at the works of the Wheeling Mold & Foundry Company, Wheeling, W. Va. Nine segments and a key are required to make a complete ring, which, when assembled, is 17 ft. 6 in. in diameter. There are two sections of tunnel segments, the heavy segments, with 9-in. flange, used in earth formation and weighing 13,408 lb. per ring, and the light segments, with 7-in. flange, used in rock formation and weighing 8576 lb. per ring.

The equipment used including patterns, core-boxes and core-prints are all made of metal, thereby insuring that the last mold and core are as accurate as the first. Nearly $40,000 for improvements and equipment for handling and making these castings was expended by the Wheeling Mold & Foundry Company, whose experience in this line is of long standing.

The manufacture of these castings is done mostly under one roof, a building 575 ft. long and 60 ft. wide, equipped with three over-head traveling cranes, two traveling wall cranes and a sand blasting outfit. Starting at one end of the building is the foundry proper. The casting is put through its various operations until it reaches the other end of the building finished and ready to load on board a car for its destination, namely, New York.

Just ten years ago this same firm was working

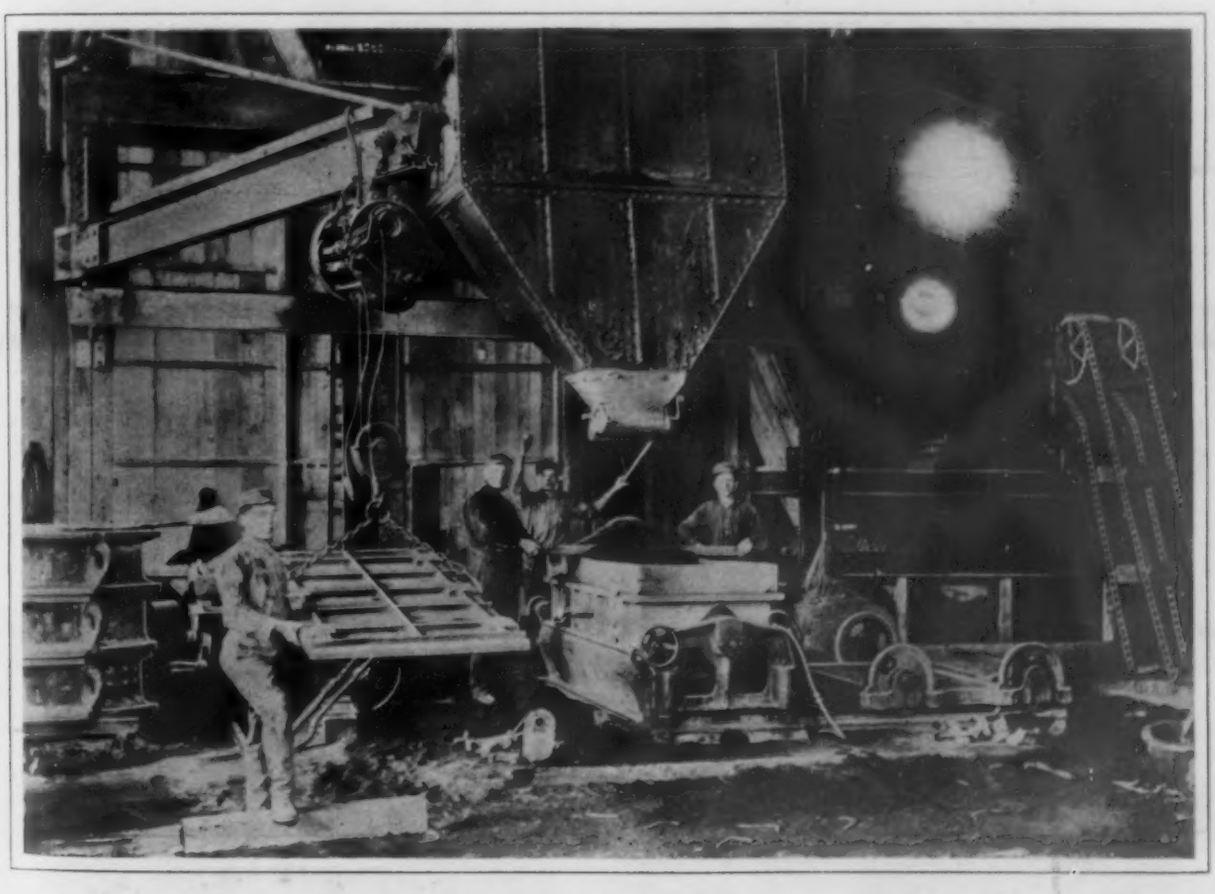

Fig. 1—Osborn Molding Machine Under Sand Hopper, Showing Sand-Mixing Conveyor and Mold Car at Right

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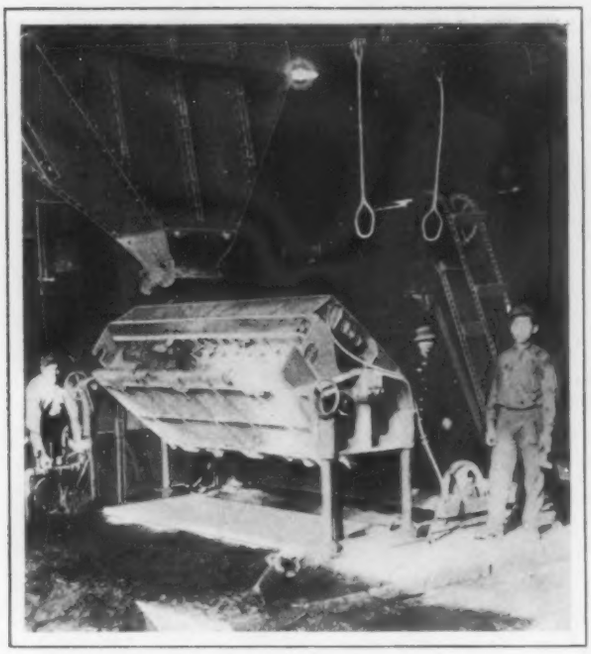


Fig. 2—Rolling Oven Machine

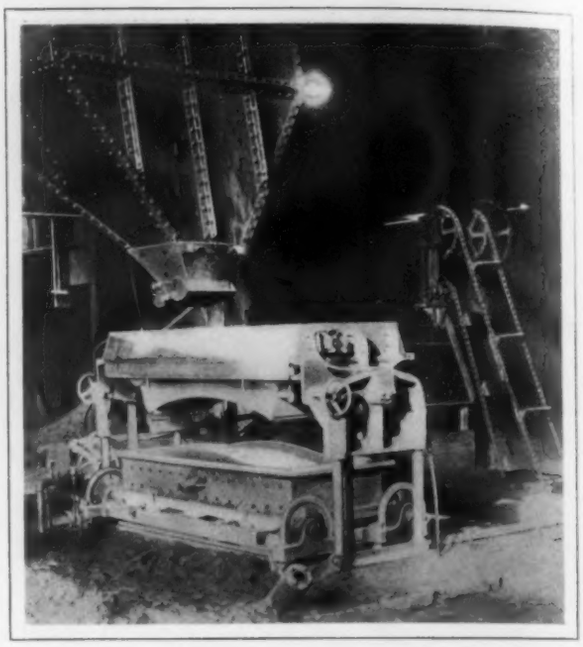


Fig. 3—Mold on Car and Pattern Drawn

on an order of 63,000 tons of cast-iron tunnel segments used in the construction of the East and North river tunnels of the Pennsylvania Railroad Company, but since that time wonderful improvements have been made in the way of equipment. In the foundry and core-room, the molds and cores are now made by machines. The cores are more uniform to size and shape than those made by hand because of the clean and accurate draw of the core from the core-box, which is held in perfect alignment. The drag and cope molds made by the machines will produce a casting even superior to those made by hand ramming. My reason for this assertion is that it produces a casting more true to pattern, as rapping of the pattern is necessary to loosen the pattern from the mold before drawing hand-rammed molds. This is sometimes done very carelessly by the molder, thereby enlarging the mold considerably and giving increased sections in various parts of the casting which are not needed.

Machine molding does away with this uncertainty of careless rapping by the use of a vibrator. It vibrates the pattern loose from the mold, the enlargement caused by the vibration being so small that it is hardly noticeable. This advantage over hand-rapping produces a casting truer to the pattern.

The percentage of rejected and defective castings is reduced. This is due to the fact that the machine does uniform ramming. The knack of ramming just right by hand comes only with continued practice and comparison of the results obtained. This requires experienced and careful men. The ramming variation of the molds done by a gang of men on the same class of work is sometimes very great. The result is, if rammed too hard or too soft, the casting produced will be full of blow-holes, sand-holes, scabs or swells. While on the other hand, after determining the required number of blows that are necessary to ram the mold just right,

Fig. 4—Jolt Machine for Making Cope Molds

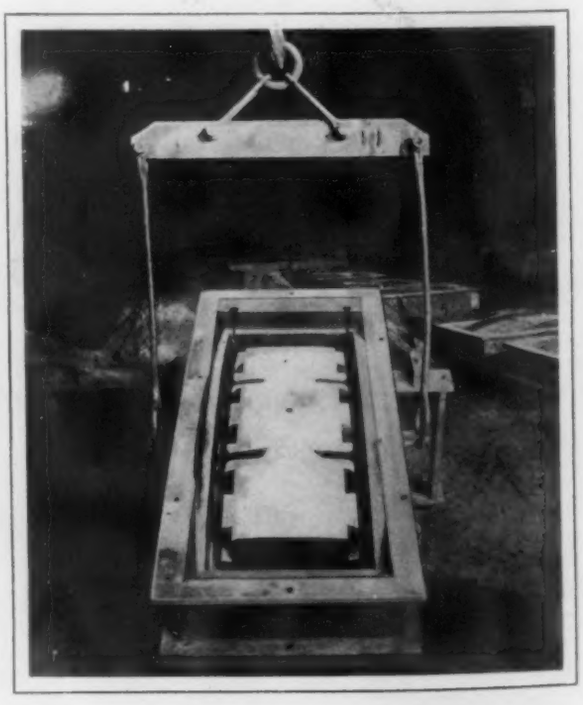


Fig. 5—Drag Mold Ready for Pouring Floor

an inexperienced man with no knowledge of foundry work is put on to operate the machine with instructions that each mold made upon the machine is to be given the same number of blows, as determined by an experienced foundryman. Carrying out these instructions, the operator of the machine will produce every mold rammed upon the machine uniformly the same, and thereby avoid to a greater extent those defects that are caused by soft and hard ramming by hand.

Another source of great trouble is blow-holes caused by poor venting of the molds rammed by hand. This uncertainty is also avoided by machine made molds, as we can depend entirely upon the porosity of the molding sands, for the escape of gases, and do not have to provide channels or vents for the gases to escape. The use of swabs on machine-made molds is also eliminated. Swabs are used on hand-rammed molds to moisten the edges of the sand around the pattern before drawing it from the mold. The foundry swab is a dangerous tool. Its danger lies in a too free use of the water around the mold, which may result in blow-holes. Taking into consideration the dangerous causes that generally produce defective castings which are partly or entirely avoided by machine-made molds, one may safely say that the percentage of rejected and defective castings will be reduced considerably.

Molds made upon machines can easily be held within 4 per cent. of the required weight, while my records on past tunnel contracts show a variation of 10 per cent. in the weights of the castings poured from molds rammed by hand. The explanation for this is that no rapping of the pattern is necessary, thereby not enlarging the mold. Another reason is that they are rammed just right by a given number of blows, thereby avoiding soft rammed molds which is a common trouble created by hand-rammed molds. Soft rammed molds produce heavier castings than those desired, because the sides of the mold are not strong enough to withstand the pressure of the molten metal, under which circumstances expansion will take place, and in extreme cases swells will appear on the casting.

More stock for machining is due to the fact that there is a uniform ramming of the molds and no rapping of the pattern is necessary before drawing. It is very desirous to obtain sufficient amount of stock for machining so as to have as little strain as possible upon the cutters. If the amount of stock left for machining is too great, it causes a great strain upon the cutters, dulling them, and therefore producing a rough and ugly machined surface. This trouble is also of great interest to the manufacturer, but he looks upon it in a different light. With him it means dollars and cents, for it is poor business policy to pay $14 per ton for pig iron to machine into borings which usually sell for $7.50 per ton.

Fig. 1 shows an Osborn direct draw roll-over jolt machine, made by the Osborn Mfg. Company, of Cleveland, Ohio; also part of the sand mixing conveyor and a crane for handling the bottom plates. To the extreme right is shown part of the sand-mixing conveyor. The old and the new sands in the proportion of one part to ten parts are shoveled into a hopper built below the ground level, from which the sand is conveyed by means of chain buckets to another hopper built about 6 ft. above the ground level. From this hopper the sand enters the screen, falling below to another hopper built below the ground level which contains two spiral screws. These screws cut the sand and at the same time bring it forward to the elevating buckets, which convey it to the large hopper. Directly under this hopper is the Osborn molding machine upon which the drag molds are made.

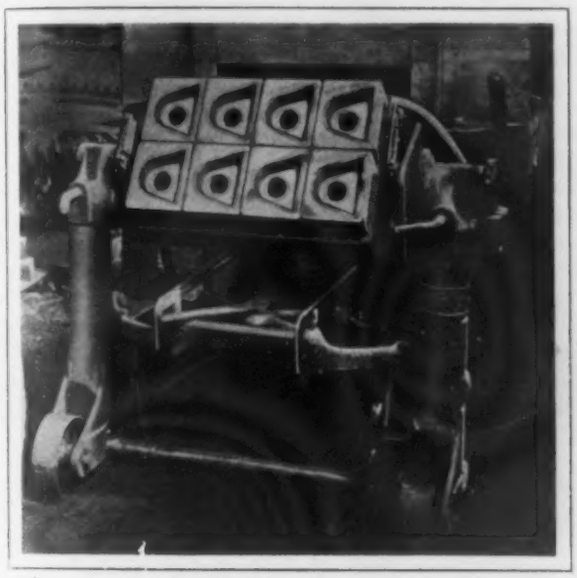


Fig. 6—Machine Molding Side Cores

Fig. 7—Rack of Side Cores Ready for Oven

Needless to say, it is upon this drag machine that the entire success of machine molding of the tunnel segments rests. The ramming, the rolling over of the flask and the drawing of the pattern are all done by air power. The machine shows the flask securely pinned to the roll-over table with a wooden hopper placed above as a sand guide. After the flask and hopper are filled with sand, the machine is then ready to be jolted. Comparison of results has shown that 80 blows of the machine are required to ram the mold correctly. Next, the wooden hopper above the flask is removed, after which the men run a stick lengthwise across the flask to level the sand with the top of the flask. This is then followed up by putting on the bottom plate, which is securely fastened to the flask. The flask is now rolled over, as shown in Fig. 2, until the grooves of the roll-over table insert themselves upon the shafts of the hand wheels located on each side of the machine, which are afterwards tightened to hold the flask and table in position. After having ac-

Fig. 8—A Segment Ready for Machining

complished this, the mold-receiving car is then pushed under the table. The roll-over table to which the flask is fastened is then lowered upon the mold-receiving car. Any unevenness of the bottom board is taken up by the use of wooden wedges.

The pins which hold the flask to the roll-over table are now loosened, the pattern being drawn from the mold as shown in Fig. 3. While raising the roll-over table, the vibrator must be in use. This will vibrate the pattern loose from the mold. There are two vibrators on the machine, one on each side of the roll-over table. One of these vibrators can be plainly seen in front of the machine connected by a hose, which is also operated by air. The mold is now resting upon the small car which provides easy means for withdrawing it from under the roll-over table. This brings the mold entirely clear of the machine, from where it may be removed to the pouring floor.

Fig. 4 shows a plain jolt machine on which are made the cope molds. (The drag and cope molds for the key can also be made on the machine.) They are rammed by power the same as the drags, but upon this machine there does not rest the credit of the successful machine molding of the tunnel segment as it does upon the drag machine, for there is no rolling-over of a flask or drawing of a pattern to contend with. After the mold is rammed, the molder builds the runner box for pouring on the machine before it is taken to the pouring-off floor.

Fig. 5 shows a drag mold as it came from the machine ready to be carried to the pouring floor to have the cores set and poured off. It also distinctly shows the pouring-off floor. From close observation of the large mold it will be readily seen that at each end there is a large opening. This is to accommodate the end core. The five end holes and bosses including half of the endside core-prints are all made in one core. The end cores are at present made by hand, but will be made upon a small Osborn roll-over machine with a direct pattern diameter as shown in Fig. 6, upon which are made the side cores. Eight side cores are made upon this machine at one time, the boxes being of metal and of one piece. They are drafted about one-thirty-second of an inch so as to have the core withdrawn from the core-box freely. Splitting of the core-box was objected to on account of leaving a fin on the 45-degree chamfer. The greatest amount of care and skilled workmanship was put on these boxes so as to insure a close-fitting core in the core-print, the object being to avoid as much as possible fins around the outside of the boss when poured. This was accomplished by machining up a master core-print and machining out the core-box one-fourth inch larger than the core-print. The master core-print is now taken and placed within the core-box and babbitt metal poured around, thereby insuring the shapes of the core and the core-print to coincide.

Fig. 7 shows a rack of side cores ready to go to the oven to be baked, which usually takes from four and a half to five hours. After setting the cores and enclosing the drags with copes, we are then ready to pour. This brings us to the question of the iron. It is of a good quality No. 2 gray pig iron, remelted in a foundry cupola. No mill cinder iron, white or burnt iron of any kind, nor old fire-bar scrap will be permitted in the composition.

The test samples are cast from the same heat, but as the heat in a cupola is a continuous process, a set of two test bars is required for every 20 tons of castings poured or fraction thereof above this amount. In case of a change of mixture during the heat, one set of two bars shall be cast for every mixture other than the regular one. The quality of the iron going into the castings is determined by means of the "Arbitration Bar." This bar is 1¼ in. in diameter and 15 in. long, which has to withstand a minimum breaking strength under a transverse load of not less than 3000 lb., and a deflection of not less than 0.10 in. After the bars have passed the physical tests, borings are taken from them for chemical analysis. Should any of the test bars fail, it would be an easy matter to pick out the castings represented by the tests, as the castings and the test bars are marked for every 20 tons or fraction thereof above this amount. The molds are poured from a large crane ladle. Much skill is required in pouring, and a molder must know the character of the work and judge whether it must be poured fast or slow. In general, light work cannot be poured too fast. Heavier work is poured more slowly. Care must be exercised to keep the stream steady from the first, and not to

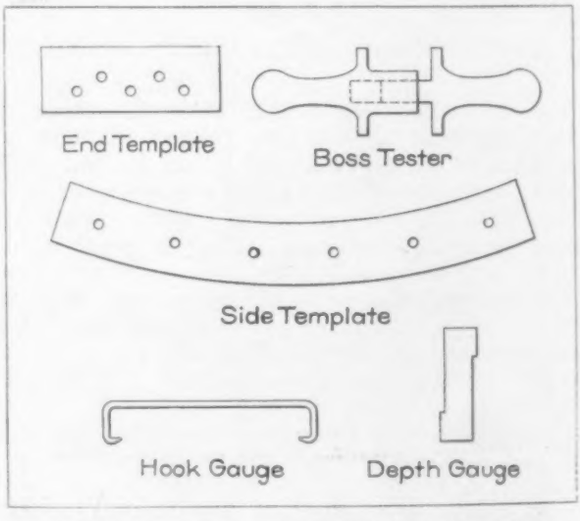


Fig. 9—Templates and Gauges Used by Inspectors

spill into the mold, as this may cause "cold shuts" or leave "shot" iron in the castings.

After the castings are sufficiently cooled, the flasks are shaken out. The company's own foundry inspector now goes over them roughly to see the result of the day's cast, rejecting all castings where the injury is of such serious consequence that it is impossible to use it, such as blow-outs, run-outs, cope drops, and poured short castings. These troubles are never put up to the Public Service Commission inspectors to pass upon, as they would not

be given any consideration at all. From the shake-out floor the castings are then sand-blasted, and while the temperature of the casting is still above 300 deg. F. it is dipped in a vat containing tar, which acts as a protective coating. After being dipped, they are placed upon skids and allowed to drain off. They are then sent to the chipping department to have the fins, risers, and gates chipped off.

Fig. 8 shows a general view of the heavy segment as it leaves the chipping department, ready to be machined. Machining of the sides and ends including the drilling and tapping of the grout hole is the next operation. The side and end holes are all drifted and then put up to the Public Service Commission inspectors for final inspection.

Fig. 9 shows the apparatus used by the inspectors to check up the castings. The sides and end templates are used to check up the bolt holes in the circular and longitudinal flanges. They are made of steel with pins one-fourth of an inch longer than the full thickness of the flange, and representing the bolts, and said steel pins, being one-fourth inch in diameter smaller than the size of the holes in the casting, shall drop freely on to the flanges with the pins in the bolt holes, without straining, and so that the ends of the templates representing the machined faces of the segment shall not be in error with the segment faces either way. The boss-tester is used to check up the faces of the bolt bosses, which must be true and parallel to the plane of the finished joint. The hook gauge, the width of the machining, and the depth gauge the maximum and minimum depth allowed the caulking strip. The castings are also gone over for surface inspection at this point, looking out for blow-holes, sand-holes, swells, scabs, cold-shuts, shrinkage cracks, twists, etc. After having passed inspection, they are stamped, the machined surfaces are coated with white lead and tallow so as to prevent rusting, the weights are taken, and they are then placed on board a car ready for New York.

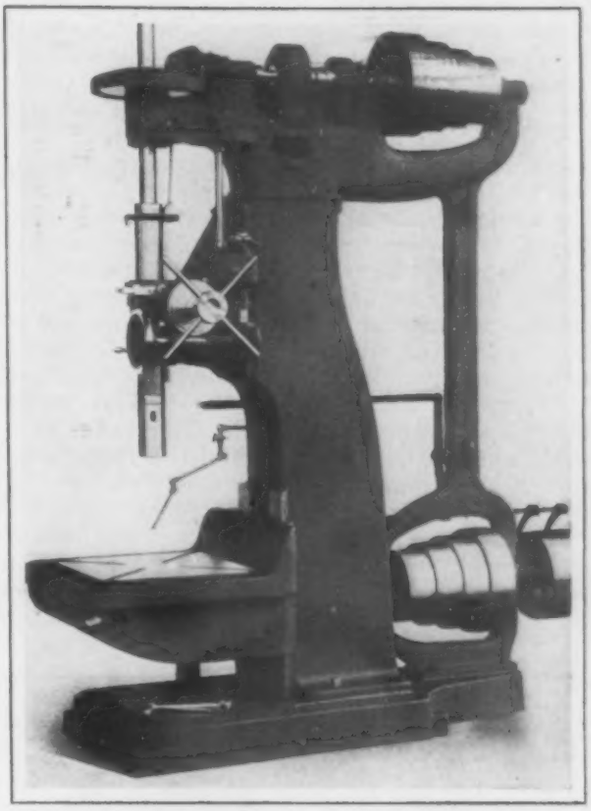
Vertical Machine for Heavy Drilling

A box column type of vertical drilling machine, intended particularly for heavy work in steel, has been developed by the Cincinnati Bickford Tool Company, Oakley, Cincinnati, Ohio. The table is furnished with a screw support in addition to being clamped on the column. A wide range of spindle speeds and feeds is provided.

As will be noticed from the accompanying engraving, the machine is of massive construction and is regularly furnished with four-step cone pulleys for a belt drive. This arrangement gives eight spindle speeds, ranging from 50 to 300 r.p.m., four through the belt drive, this number being doubled by the use of back gears. The largest step on the cone pulley is 16 in. in diameter, while the smallest is 10.9 in., the belt used measuring 4 in. in width.

The power is transmitted by a 4½-in. belt, running over tight and loose pulleys, 14 in. in diameter, at a speed of 545 r.p.m. The bevel driving pinion is of high carbon steel, while the one on the spindle is unhardened, and is made from a special mixture of steel.

The spindle is a high carbon steel forging which is 2-9/16 in. in diameter in the sleeve, and 2-7/16 in. above it at the smallest point. The taper of the spindle conforms to the Morse No. 5 standard, and the spindle has a vertical travel of 18 in., and six rates of feed ranging from 0.007 to 0.049 in. per revolution of the spindle.



A Machine That Has Recently Been Developed for Heavy Drilling in Steel

The table, which is of massive construction and is supported by a screw from the base as well as being clamped on the column, has grooves or channels to take care of the drilling lubricant. A vertical travel of 12 in. is provided for the table, the maximum hight from the floor being 30 in., while the maximum distance between the spindle and the table is 1 in. greater.

The machine will drill to the center of a 30-in. circle and is 105 in. high. It weighs 5100 lb.

Steel Treating Research Club

The Steel Treating Research Club, Detroit, the name of which serves to indicate the scope of its activities, has elected the following officers: President, C. N. Dawe, chemist and metallurgist, Studebaker Corporation, Detroit; vice-president, William Tatio, Detroit; secretary-treasurer, Charles R. Poole, chemist and metallurgist, Frost Gear & Forge Company, 133 Steward avenue, Jackson, Mich.

The club was organized in Detroit in March, 1914. The active membership includes foremen and assistant foremen of case-hardening and heat-treating departments, toolsmiths and tool hardeners, chemists and metallurgists. The associate membership comprises salesmen and representatives of concerns dealing in articles and materials used by the heat-treating departments of modern metal-using industrial establishments. The meetings are held in the rooms of the Detroit Engineering Society.

The plant and equipment of the Roberts Motor Company, Sandusky, Ohio, have been sold to F. P. Zollinger, trustee for the bondholders. It is expected that the property will be turned over to the Roberts Motor Mfg. Company, which was recently organized and is now operating the plant.

The Mansfield Tire & Rubber Company, Mansfield, Ohio, has taken over the management of the newly organized Columbia Tire & Rubber Company, Columbiana, Ohio, and the plant of the latter will be operated as an associated concern, but as a separate corporation.

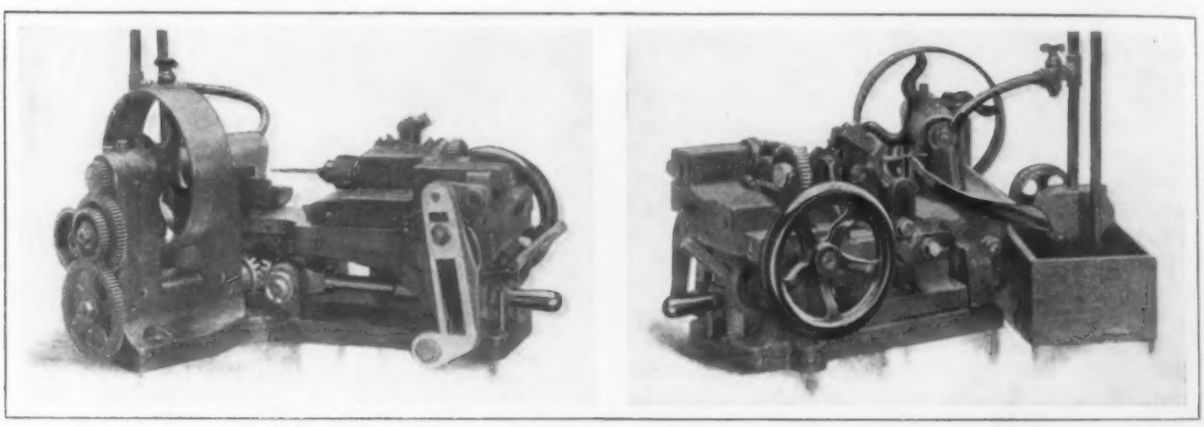
Automatic Machine for Fluting Drills

For fluting twist drills ¼ in. in diameter and smaller, the Bickford Machine Company, Greenfield, Mass., has developed a special machine. It is fully automatic for both forward and return movements of the carriage as well as indexing between the two flutes of the drill and the angle between the cutter spindle and the line of carriage travel is maintained constant, a special device providing increase of lead and thus changing the angle of the cutting lips of the drill. In the accompanying illustration the view at the left shows the method of driving the feed, while that at the right illustrates how the spiral and the increase twist are obtained.

From the cutter spindle the feed is driven through spur, bevel and worm gearing to the cross shaft which carries a crankwheel and imparts the movement to the carriage through an arm of peculiar L shape. It is pointed out that this special form of arm is needed to give a constant rate of speed when the crankwheel is making that portion of its revolution while the drill is being cut. Where the link from the upper end of the arm is attached to the carriage the surfaces in contact are fluted with a view to preventing slippage, and this same arrangement is employed to attach the crank pin, an adjustment for different lengths of carriage travel being provided. The carriage travels on a frame which is arranged to swing on the bushings forming the bearings for the crankwheel shaft, the front end of this frame carrying the bushing through which the drill is milled. A lever underneath has one end arranged to swing on a stud provided with an elevating screw and clamped to the frame of the machine. The other end is carried downward by a cam on the crankwheel shaft during the forward movement of the carriage, the drop being increased materially at the end of the carriage travel. This lever is connected with the swinging frame by a short link, this construction being relied upon to provide the increase of thickness for the web of the drill and also to drop the drill free from the cutter during the return stroke.

The drill or work spindle is connected through spur gears to a shaft carrying a bevel pinion in mesh with a bevel gear mounted on the side of the carriage, and a slotted arm which derives its motions as the carriage moves forward by contact with a small roller, which is adjustably attached to the frame of the machine, rotates the bevel gear. A movement of 45 deg. of the slotted arm is sufficient, by reason of the ratio of the gears, to give 1¼ revolutions of the drill spindle, which is enough to give the required spiral. This is accomplished by setting the pin which carries the roller at such a hight that the arm will make the necessary swing from its vertical position during the time that the drill is being fluted. As the pin travels in a horizontal direction with relation to the center of the bevel gear, the speed of revolution of the gear will be constantly decreased, thus giving the increase in length of the spiral to the flute of the drill.

The upper end of the swinging arm carries a short shaft having a rectangular button at one end and at the other a disk with four pins arranged so that at each return of the carriage the button is given a quarter turn by the latch in the top of the carriage, and presents a side and then an end to a block on the bevel gear. This gear is arranged to stop at a certain position as the carriage comes back, and the button picks it up on its forward movement, the difference in position between the contact of the side or end of the button being equal to a half revolution of the drill spindle. In the engraving at the right the carriage is in the position where the button has made its quarter turn and is ready to pick up the block on the bevel gear with its end. A pull spring and chain running over a grooved pulley are relied upon to take up the back lash of the gearing during the return stroke, and a pair of gears having a ratio of 2 to 1 throws the feed worm out of engagement on completion of the second flute of the drill. A handwheel is attached for convenience in setting up the machine, as a single turn of it performs the entire operation of making one flute.



Two Views of an Automatic Machine That Has Recently Been Developed for Fluting Twist Drills, Showing the Methods of Driving and Obtaining the Spiral and the Increase Twist

The machines are intended to be placed in a row on a bench and a special form of guard and an oil spout enables the cutter to be flooded with oil or cutting compound and carries the chips to a long trough. This conveys the oil to a supply tank after passing through a strainer from which it is pumped back to the machine for use. High-speed cutters are employed and the machines have a productive capacity of 30 ¼-in. drills per hr., a range of five different feeds for smaller drills being secured through change gears.

A number of improvements are being made to the blast furnace of the Perry Iron Company, Erie, Pa., which will go in blast shortly. They will include the installation of a pig casting machine and a slag handling plant. Orders have been placed with the Whiting Foundry Equipment Company, Harvey, Ill., for a 100-ton ladle crane for handling several 75-ton ladles, which will be used for direct pouring, and a bucket crane for handling slag. Power will be supplied from a new 150 kw power plant. The improvements are being made under the direction of Arthur G. McKee & Co., consulting and contracting engineers, Cleveland, Ohio.

Molding Machines and Pattern Mounting

Interesting Analysis of Foundry Practice —Adaptability of Various Machines Compared—Efficiency in Pattern Mounting

BY J. FRANKLIN ERVIN*

All manufacturers of duplicate machinery requiring grey and malleable iron parts are confronted with the question of pattern equipment. Whether or not the manufacturer operates a foundry does not necessarily affect the question of the pattern and molding machine equipment requisite for the economical production of his product. It is the practice of foundrymen to furnish all equipment which is interchangeable, such as benches, squeezers, snap flasks, etc., while all special machines to which a pattern is mounted, together with all equipment such as flasks, etc., are chargeable to the manufacturer.

The type of mounting has much to do with the economical production of accurate castings. Almost all castings of the light type, as malleable and grey iron parts for agricultural implements, range in weight from a few ounces to two hundred pounds, and have a high ratio of surface area to total weight. This point is worth considerable attention, since a small amount of rapping for hand draft will easily add ten per cent. to the total weight, which is a direct loss to the manufacturer when castings are purchased by the pound and sold by the piece. Accuracy in the product will warrant the expenditure of no small sums when large orders are called for in order to overcome any defects and avoid the return of large quantities of castings to the foundryman. The labor of inspecting and handling, coupled with more or less machine work done before defects are discovered, is a total loss.

Table of Relative Costs

Machine or Method	Machine Cost	Type of Pattern	Pattern Cost	Type of Mounting	Mounting Cost	Total Cost	Cost to Manufacture
1. Floor	...	1 Gate	$25	Hard sand; Match wood frame	$2	$27	$25
2. Bench	$10	1 Gate	25	Hard sand; Match wood frame	2	37	25
3. Hand squeezer	40	1 Gate	25	Hard sand; Match wood frame	2	67	25
4. Power squeezer	100	1 Gate	25	Hard sand; Match wood frame	2	127	25
5. Power squeezer	100	1 Gate	25	Double faced; Aluminum match	15	140	40
6. Roll over, single head cope and drag type	300	1 Gate	25	1 cope match; 1 drag match	50	375	75
7. Roll over for drag and stand for cope	165	1 Gate	25	1 cope plate; 1 drag plate	50	240	240
8. Drop plate; hand ram, one machine for cope and one for drag	150	1 Gate	25	1 cope plate; 1 drag plate	75	250	250
9. Drop plate, power squeeze; one machine for cope and one for drag	300	1 Gate	25	1 cope plate; 1 drag plate	75	400	400
10. Jolting drag and squeeze cope	200	1 Gate	25	Hard sand; Match wood frame	200	227	25

Methods pursued by manufacturers in producing their patterns and equipment vary little. A drawing from the engineering or experimental department is sent to the pattern department where an initial or experimental pattern is produced in wood or metal, depending upon what is required of it. Trial castings are then made by the foundry, and following the testing and inspecting stages, additions, subtractions or alterations are suggested. These suggestions go back to the engineering or experimental departments where, after revision, the pattern drawing is reissued to the pattern shop with additional orders. After one or more trials, similar to the above, the machine is either adopted or rejected. If adopted, the foundry problem begins.

The foundry foreman is first confronted by the cost estimating department with the plain question, How much will it cost to mold? The foreman in turn must know the estimated annual requirements and form in his mind a method of molding for which he proposes to pay a certain fixed price. Unless pressed for low figures, he starts with a price he is confident he will be able to better.

In order to meet the requirements of production and price, the foundry foreman consults with the pattern-shop foreman and the designing department, and the casting is analyzed in detail. These details are of decided importance in determining the method of gating. The mounting is controlled by the quantity required, as well as by the particular design of the casting.

*Consulting engineer, Moline, Ill.

ITEMS OF COST

The major item of foundry cost is molding and it is the one upon which all others are largely dependent. The method finally adopted to satisfy all conditions must take account of the following factors: 1. Quantity required, 2. Uniformity of weight, 3. Accuracy, 4. Economical cost of equipment, and 5. Cheap production. To determine the quantity required is a function of the sales organization, while uniformity of weight and accuracy are problems individual to the particular design of casting.

The kind of equipment is also dependent to a great extent on the above named requirements, but is also governed by the methods adopted to promote cheap production in the foundry.

Types of Molding Machines and Methods in General Use

1. Floor molding.
2. Bench or stand molding.
3. Hand squeezer machines.
4. Power squeezer machines.
5. Roll over, single head for cope and drag, and hand squeeze.
6. Roll over for drag and stand for cope.
7. Drop plate, hand ram with separate machines for cope and drag.
8. Drop plate, power squeeze with separate machines for cope and drag.
9. Combination jolt and squeeze.
10. Several other combinations, such as squeezing and drawing cope and drag at one operation with the pattern stationary; multiple molding and combinations of two or more of the above simple methods.

An everyday foundry problem is here analyzed in careful detail.

Types of machines and practical methods of molding to specifications are tabulated, to give the gist of the problem at a glance.

The question of pattern mounting is emphasized and its importance in practice shown.

ADAPTING PATTERNS TO METHODS AND MACHINES

The adaptability of a particular pattern to a particular machine can best be decided by an analysis of the advantages and disadvantages offered by each method of mounting.

The accompanying table of costs of a simple pattern with various mountings shows the total cost of equipment to produce castings, and the portion thereof chargeable to the manufacturer for a pattern requiring a 10 x 14 in. flask, 4 in. drag and 4 in. cope, which is cited as a typical example.

ADVANTAGE AND DISADVANTAGE OF METHODS

Each method of molding affords advantages and disadvantages as applied to each individual pattern. The accompanying tabulation presents the general considerations. Floor molding is applicable to a class of work too heavy to handle on bench.

HAND, SQUEEZE AND JOLT RAMMING

Hand ramming has the advantage where irregular work is molded, since the molder can ram hard or soft according as it is necessary to give perfect castings. This method has the disadvantages of requiring an experienced molder on the job, and the time element, since 0.3 min. per sq. ft. of flask area is required for hand ramming.

Squeeze ramming is advantageous where work is not too deep and no bars are required in the

An Analysis of the Advantages and Disadvantages of the Different Methods of Molding

Floor Molding

Advantages:
1. Small cost of equipment.
2. Good for accurate work in matching cope and drag, since cope is matched over drag.

Disadvantages:
1. Molder required on work.
2. Difficult due to stooping position of molder.
3. Drawing pattern from sand by hand.
4. Hand ramming.

Bench Work

Advantages:
1. Accuracy of work—matching cope over drag.
2. Ease of handling due to position of molder.
3. Small cost of equipment.
4. Small cost of changing jobs.

Disadvantages:
1. When cores are to be set in cope.
2. When work is required on cope after drawing.
3. Drawing pattern by hand.
4. Molder required on work.
5. Hand ramming necessary.

Squeezer

Advantages:
1. Accuracy of work in matching cope over drag.
2. Ease of handling due to position of operation.
3. Low cost of machine.
4. Small cost for changing jobs.
5. Speed and ease of ramming.
6. Machine man sufficient on job.

Disadvantages:
1. Cores in cope.
2. Work necessary on cope.
3. Drawing pattern by hand.
4. Unequal ramming (hand power machine).
5. Unequal ramming—irregular patterns.

Roll Over, Single Head Cope and Drag Made at Same Time

Advantages:
1. When drawing pattern from sand is advantageous.
2. When cores are set in cope.
3. When work is necessary on cope.
4. When difficult draws are in the cope.

Disadvantages:
1. Error of making cope and drag from separate plates.
2. Necessary clamping to roll over.
3. Weight of working parts of machine to secure perfect alignment under stress.
4. Complication of machine makes repair charges high.
5. Awkward position of flasks for closing.
6. Cope reverse side up for closing.
7. High cost of mounting.
8. High cost for changing patterns.

Roll Over for Drag and Stand for Cope

Advantages:
1. Difficult draws in the drag.
2. No bars required in drag.
3. Where work is too heavy for one man to handle easily.

Disadvantages:
1. Error of making cope and drag from separate plates.
2. Clamping to roll over on drag.
3. High cost of mounting.
4. Initial cost of machine and equipment.
5. Cost of changing jobs.
6. Hand ramming.
7. Hand draft for cope.

Drop Plate

Advantages:
1. Ease and accuracy of draft.
2. Speed possible in drawing.

Disadvantages:
1. Cost of mounting.
2. Cost of machine and equipment.
3. Drag reverse side up when drawn.
4. Hand ramming (this is eliminated in power squeezing machine).
5. Cost for changing patterns.
6. Error of making cope and drag from separate plates.

Combination Jolt and Squeeze

Advantages and disadvantages are the same as for power squeezing, with the added advantage that a mold with deep and irregular drag can be rammed while the sand is being shoveled.

flask. The reluctance of molding sand to flow under pressure plays an important part in the possibilities of squeeze ramming to uniform hardness over irregular surfaces. Experiments by the writer have shown that sand will not flow under a pressure of 60 lb. per sq. in. upon a surface inclined at less than 60 deg. with the horizontal. This causes the sand to pack hard over thin surfaces and remain soft in the recesses.

The area of the flask further defines the limits of economical squeeze ramming. A flask with an area of 2.5 sq. ft. requires about 7½ tons pressure, which is the equivalent of 80 lb. air pressure on a 16 in. cylinder. A machine correctly designed to withstand such a pressure is heavy and cumbersome and not practicable where shallow and light flasks are used. The use of other than snap flasks is also prohibited without the use of a sand frame similar to that used with the jolt rammer, since the sand is rammed below the flask surface.

Cost sheets that show in dollars and cents the relative economy of various methods of producing a light casting.

A summary of the weights involved, operations necessary and the time required, etc.

Each method discussed, together with other important conclusions.

ANALYSIS OF OPERATIONS IN VARIOUS METHODS

The operations necessary, weights handled and differential time elements give us the relative efficiency of each method or type of equipment when the pattern is taken as a constant. The cheapness of molding is governed by the simplicity of operations and the amount of material necessary to handle. The following related data is based upon a simple pattern mounted for the making of a mold by each of the following methods. The mold and equipment have the following specifications, using a flask 10 in. x 14 in. x 8 in. deep, both cope and drag having a depth of 4 in.

Specifications

Weight of molding sand	54 lb
" " snap flask, cope or drag	6 lb
" " cope squeeze board	4 lb
" " bottom board	4 lb
" " match	12 lb
" " pattern	3 lb
" " double faced aluminum match	6 lb

In the accompanying table of weights and time the efficiency of each method of machine molding is based upon the total time required to perform the total molding operations and upon the class of man required for the operation. The machine man is rated in relation to the molder at a ratio of 35 and 50, while the drop plate power squeezing machine which requires the minimum time for producing the part is rated as 100 per cent. efficient. The production efficiency of each method is based wholly upon the merits of each method without

Cost Sheets for Eight Different Methods of Molding to the Specifications Given

Bench Molding with Match Gated Pattern and Snap Flask

Operations	Weights handled, in lb.	Time elements, in seconds
Match on machine or floor	15	3
Drag flask on machine	6	4
Screen sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Hand ram	..	18
Strike off	..	6
Put on drag board	4	3
Roll over	51	6
Remove match	12	4
Put on cope flask	6	4
Riddle sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Hand ram	..	18
Strike off	..	6
Lift cope	33	10
Draw pattern hand	3	8
Close mold	33	10
Remove flask	12	5
Set mold on floor	58	9
Total weight handled	293 lb.	146
Total time	2 hr. 26 min.	

Hand Squeezer with Sand Match, Gated Pattern and Snap Flask

Operations	Weights handled, lb.	Time elements, sec.
Match on machine or floor	15	3
Drag flask on machine	6	4
Screen sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Hand ram	..	..
Strike off	..	4
Put on drag board	4	3
Roll over	51	6
Hand squeeze	..	6
Remove match	12	4
Put on cope flask	6	4
Riddle sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Strike off	..	4
Put on cope board	4	3
Hand squeeze	..	6
Remove cope board	4	3
Lift cope	33	10
Draw pattern hand	3	8
Close mold	33	10
Remove flask	12	5
Set cope and drag on floor	58	9
Total weight handled	301 lb.	130
Total time	2 hr. 10 min.	

Power Squeezer Using Pattern Equipment Same As on Hand Squeezer

Operations	Weights handled, lb.	Time elements, sec.
Match on machine or floor	15	3
Drag flask on machine	6	4
Screen sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Strike off	..	4
Put on drag board	4	3
Roll over	51	6
Power squeeze	..	3
Remove match	12	4
Put on cope flask	6	4
Riddle sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Strike off	..	4
Put on cope board	4	3
Power squeeze	..	3
Remove cope board	4	3
Lift cope	33	10
Draw pattern hand	3	8
Close mold	33	10
Remove flask	12	5
Set mold on floor	58	9
Total weight	301 lb.	124
Total time	2 hr. 4 min.	

Power Squeezer with Double Faced Aluminum Match

Operations	Weights handled, lb.	Time elements, sec.
Match on machine or floor	6	3
Drag flask on machine	6	4
Screen sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Strike off	..	4
Put on drag board	4	3
Roll over	42	6
Put on cope flask	6	4
Riddle sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Strike off	..	4
Put on cope board	4	3
Power squeeze	..	4
Remove cope board	4	3
Lift cope	33	10
Draw pattern hand	6	5
Close mold	33	10
Remove flask	12	5
Set mold on floor	58	9
Total weight handled	276 lb.	115
Total time	1 hr. 55 min.	

Drop Plate

Operations	Weights handled, lb.	Time elements, sec.
Match on machine or floor	6	4
Screen sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Hand ram	..	18
Strike off	..	6
Drop pattern	..	3
Put on drag board	4	3
Set drag on bench	33	5
Put on cope flask	6	4
Riddle sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Hand ram	..	18
Strike off	..	6
Drop pattern	..	3
Close mold	33	10
Remove flask	12	5
Set mold on floor	58	9
Total weight handled	214 lb.	132
Total time	2 hr. 12 min.	

Roll Over for Drag and Stand for Cope

Operations	Weights handled, lb.	Time elements, sec.
Drag flask on machine	6	4
Screen sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Hand ram	..	18
Strike off	..	6
Put on drag board	4	3
Clamp	..	3
Roll over	33	5
Draw pattern hand	..	6
Roll back pattern	20	3
Set drag on bench	33	5
Put on cope flask	6	4
Riddle sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Hand ram	..	18
Strike off	..	6
Draw pattern hand	33	5
Close mold	33	10
Set mold on floor	58	9
Total weight handled	286 lb.	143
Total time	2 hr. 23 min.	

Drop Plate and Power Squeezer with Separate Machines for Cope and Drag, or Cope and Drag Duplicates from Same Machine

Operations	Weights handled, lb.	Time elements, sec.
Drag flask on machine	6	4
Screen sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Strike off	..	4
Drop pattern	..	3
Put on drag board	4	3
Power squeeze	..	3
Set drag on bench	33	5
Put on cope flask	6	4
Riddle sand on pattern	8	8
Shovel sand on pattern	22	6
Peen	..	5
Strike off	..	4
Drop pattern	..	3
Put on cope board	4	3
Power squeeze	..	3
Remove cope board	4	3
Close mold	33	10
Remove flask	12	5
Set mold on floor	58	9
Total weight handled	220 lb.	104
Total time	1 hr. 44 min.	

Roll Over—Single Head

Operations	Weights handled, lb.	Time elements, sec.
Drag and cope flasks on machine	12	8
Screen sand on pattern	16	12
Shovel sand on pattern	46	12
Peen	..	10
Strike off	..	6
Put on drag board	8	3
Clamp	..	8
Roll over	..	10
Hand squeeze	..	10
Draw pattern power	..	8
Roll back pattern	..	8
Remove cope board	4	3
Close mold	41	10
Remove flask	12	5
Set mold on floor	58	9
Total weight handled	197 lb.	122
Total time	2 hr. 2 min.	

Weights, Time and Operation Summary

Machine and pattern equipment	Total operations	Total weight handled	Operations doing work but not handling weights	Total time required	Per cent. production efficiency	Per cent. cost of production efficiency	Type man required
Bench—with match and gated pattern	21	293	6	2 hr. 26 min.	71	50	Molder
Hand squeezer, match and gated pattern	23	301	6	2 hr. 10 min.	80	80	Machine man
Power squeezer, match and gated pattern	23	301	6	2 hr. 4 min.	84	84	Machine man
Power squeezer, double faced aluminum match	21	276	5	1 hr. 55 min.	90	90	Machine man
Drop plate, hand ram	19	214	8	2 hr. 12 min.	79	55	Molder
Drop plate, power squeeze	21	220	8	1 hr. 44 min.	100	100	Machine man
Roll over, hand squeeze, single head cope and drag on one head	15	197	7	2 hr. 2 min.	85	85	Machine man
Roll over drag, cope on stand, hand ram	21	286	7	2 hr. 23 min.	73	51	Molder

any regard being taken of the rate of the operator.

The weight handled on the squeezer, which is the least efficient on this basis, is approximately six times the weight of the mold, which verifies the necessity of having all parts, such as pattern, matches, flasks, boards, etc., as light as possible. Should the mold used for comparison pay two cents each, or $2 per hundred, the operator would be paid $2 for handling 15 tons of material, which is at the rate of 13 cents per ton.

German Steel Works Union's Review

The statement of the German Steel Works Union, issued after its regular meeting on February 25, 1915, gives the following general review of the condition of the German steel trade:

In semi-finished material domestic demand has been better and continued improvement is anticipated. Prices for the second quarter have been increased 7.50m. ($1.82) per ton, though these do not suffice to equalize the large augmentation in cost of production. Export bounties are discontinued. Business with neutral countries has increased and orders and inquiries forecast continued improvement.

In railroad permanent way material the Prussian railroads have made additional inquiries for rail fittings for 1915. The Saxony lines have increased their original demands for railroad material so that they amount to nearly three-fourths of last year's requirements, but the orders of the Bavarian roads are not half those of last year. Business with neutral countries continues on the increase. In rails for mines demand is on the same level as in former months, and domestic and foreign business in tramway rails is quieter.

In shapes customers are trying to cover requirements and specifications are increasing. Prices for the second quarter are advanced 10m. ($2.43) per ton, with export bounties also discontinued. A material betterment is reported in foreign demand and the requests for delivery from neutral lands more active.

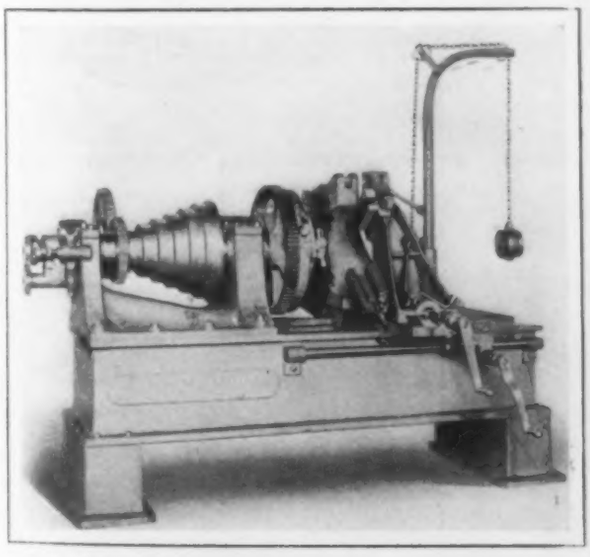
The structural engineers in Illinois have started the battle for the licensing of structural engineers by the State, and to remove the advantages which, it is asserted, the architects have had since 1898, when a law was passed making their approval necessary in the design of buildings. This law puts the structural engineer under the architect, no matter what sort of a building is put up. The work on large buildings of today, so far as safe loads and design are concerned, is done by the structural engineer. The architect's work is frequently of minor importance.

Machine for Facing Large Pipe Flanges

For facing the flanged ends of large pipes, the Detrick & Harvey Machine Company, Baltimore, Md., has brought out a machine consisting essentially of three parts. These are a threaded headstock carrying a rotating facing head, a vise or rest for holding the pipe to be faced and a bed for supporting the parts. If desired, a small crane for supporting the outer end of the pipe can be included. Two sizes of machine are built, one having a capacity for handling pipe up to 24 in. in diameter and the other having a maximum diameter of 38 in. Both sizes of machines have a number of speed changes giving sufficient variation to cover the entire range of work.

The design of the headstock is similar to that of an engine lathe, there being a cone pulley and back gears for driving the spindle. The width of the driving belt is 2½ in. in the case of the smaller machine and 4 in. for the other. On the front end of the spindle is mounted a large faceplate, having a slide way and a tool side, which has an automatic feed from the periphery of the faceplate to the center, the feed being obtained by a shaft extending through the hollow spindle. Differential gearing at the rear end of the spindle drives this shaft, which in turn transmits power to the feed screw operating the tool slide through bevel gears. The feed is disengaged by a clutch. Bronze bushed adjustable bearings and adjustable thrust bearings are provided for the spindle.

The device for holding the pipe consists of a carriage mounted on the bed and having an adjustment toward and away from the facing head by a crank handle and screw and a pair of vise jaws. The latter resemble a lathe steady rest, but are made in two parts and are operated by a right and left hand screw to facilitate rapid chucking and removal of the pipe. For squaring up the work in



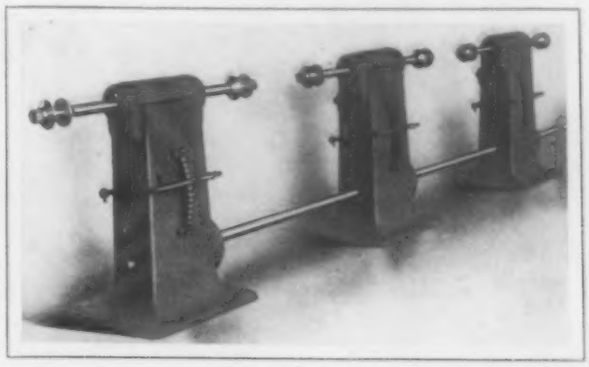
A Machine That Has Recently Been Developed for Facing the Flanged Ends of Large Pipes

chucking, a removable device which fits into the end of the spindle is provided. Four smaller radial jaws having an adjustment for varying diameters of flanges are fitted to the rest or vise jaws, which are clamped by a locking bolt provided at the top.

The Triumph Ice Machine Company, Cincinnati, Ohio, is booking numerous orders for refrigerating machinery, accessories and fittings. A list of recent sales mentions buyers in practically all sections of the country and includes one in Australia.

Polishing Lathes with Underbelt Drive

The Gardner Machine Company, Beloit, Wis., has adapted its regular underbelt type of ball bearing polishing lathe for use where there is not sufficient headroom beneath the floor to permit the



A Portion of a Group of Ball Bearing Polishing Lathes Equipped with an Underbelt Drive That Has Been Developed for Use Where the Space Beneath the Floor Is Not Sufficient To Permit the Use of Countershafts

placing of the countershaft there. With this arrangement the lineshaft passes through the base near the floor and runs in ball bearings.

The driving pulley is mounted on the shaft within each base and connected to the spindle pulley by a slack belt. An idler pulley mounted in ball bearings is forced against the belt by pushing down on the lever at the front of the machine. This removes all slack and starts the spindle revolving, the lever being locked in position by the notches in the quadrant on the front of the machine. To stop the spindle the lever is raised, thus removing the tension from the belt by the retraction of the idler pulley.

The spindle pulley and the belt are inclosed by a metal cover placed on top of the machine, and it is the general practice to cover the lineshaft in installations of this type. Practically any number of machines can be connected to the lineshaft and driven in this way.

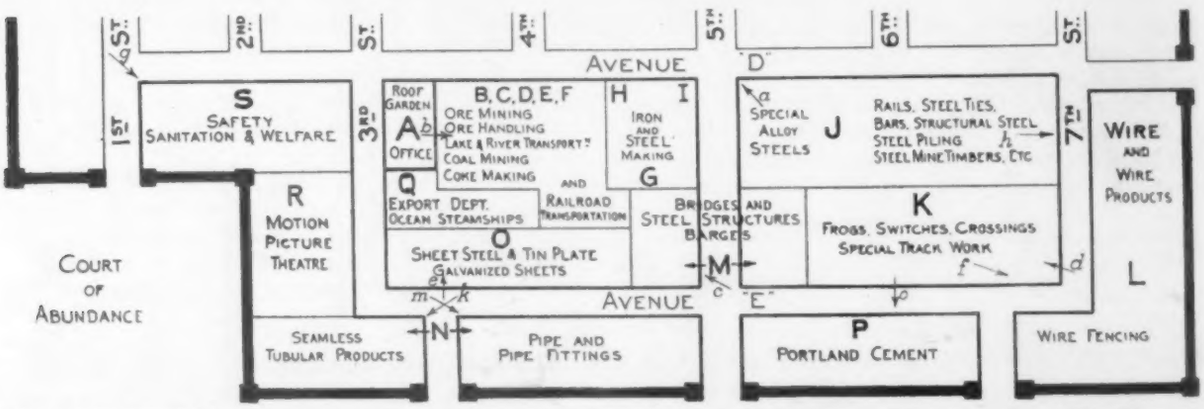
Sweden's Iron and Steel Production in 1913

Official statistics of the Swedish iron trade for 1913, only recently issued by the Swedish Board of Trade, show the production of iron ore in that year to have been 7,475,751 tons from 295 mines, as against 6,669,226 tons from 300 mines in 1912, an increase of 11.6 per cent. These figures do not include bog ore, of which the amount was small. The pig-iron output in 1913 was 730,257 tons, compared with 699,816 tons in 1912. This 1913 production included 31,966 tons of pig iron made in one electric furnace against 17,561 tons from the same furnace in 1912. The total ferroalloy and pig-iron output of this same electric furnace in 1913 was 44,100 tons compared with 24,464 tons in 1912, a decided gain. Blast furnaces numbered 148 in 1913, of which 31 were out of blast, against 147 in 1912 with 28 out of blast.

Of 590,887 tons of steel ingots and castings produced in 1913, against 515,310 tons in the preceding year, 353,696 tons was basic as against 307,637 tons in 1912. Crucible and electric steel were 5661 tons in 1913 against 3941 tons in 1912. Electric furnace castings amounted to 350 tons in 1913 and only 69 tons in 1912. The output of semi-finished and finished iron and steel was 426,204 tons in 1913 and 393,150 tons in 1912. Of the 1913 output, 140,975 tons was for export. The 1913 coal production was 363,965 tons; copper ore, 5458 tons; zinc ore, 50,752 tons and copper, 6891 tons.

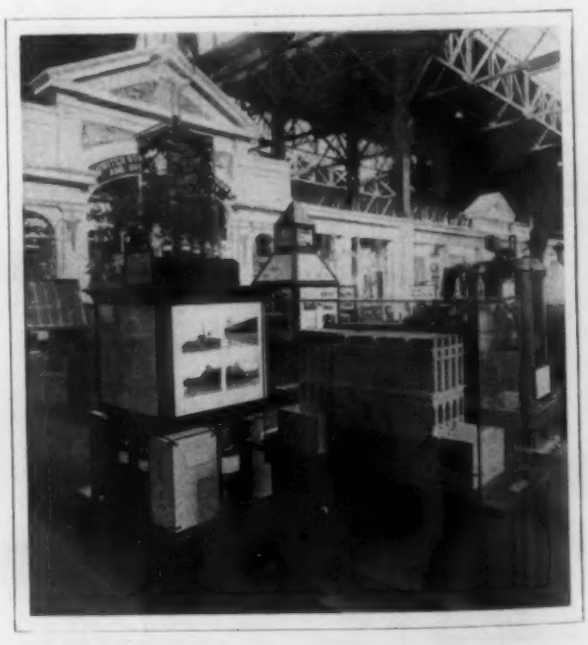
The Wheeling Corrugating Company, Wheeling, W. Va., has opened a branch sales office at Portsmouth, Ohio, in charge of J. O. Entiekin.

Photograph from Point *a* Looking Out Main Entrance

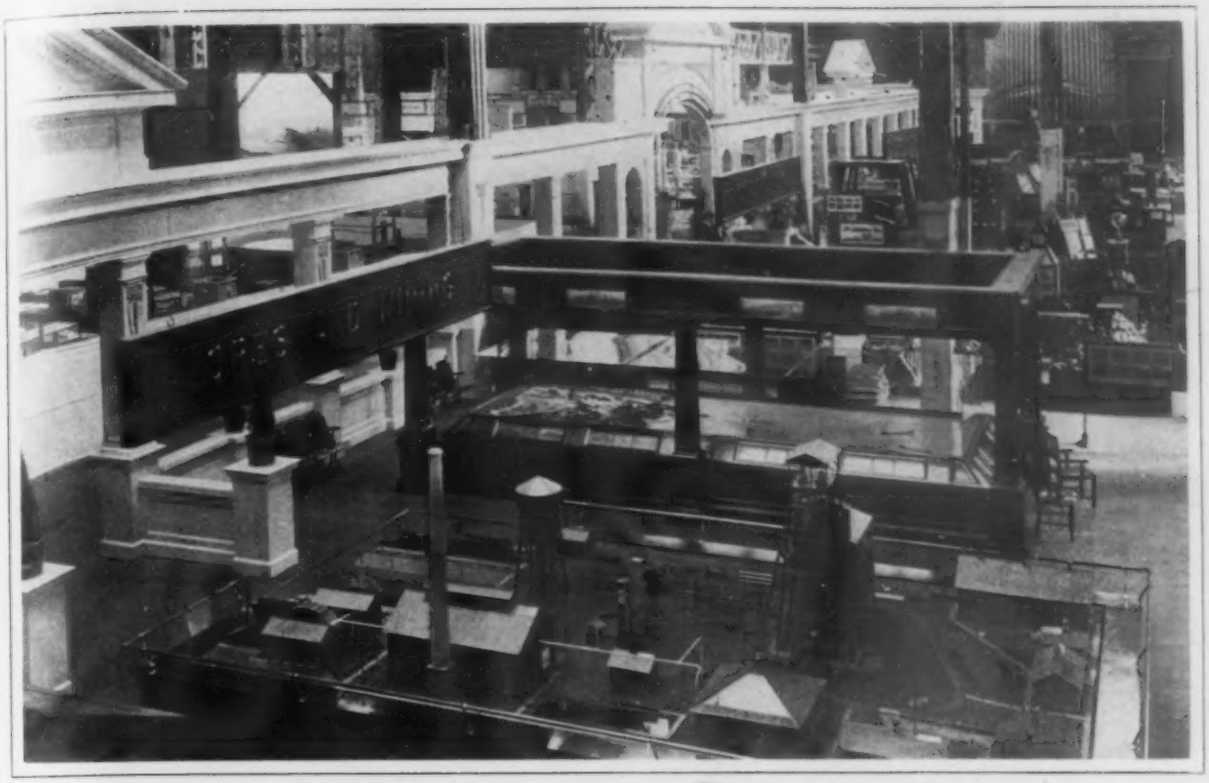


Points from Which Reproduced Photographs Were Taken of the United States Steel Corporation's Exhibits in the Mines and Metallurgy Palace of the Panama-Pacific International Exposition

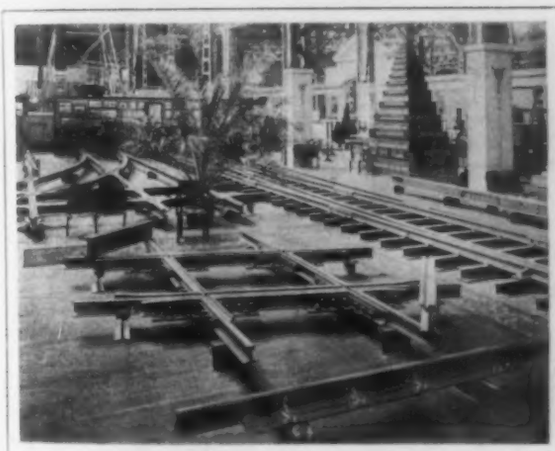
Iron Ore Pyramid with Life Size Statue of Miner



By-Products Exhibits and Model of Coke Oven



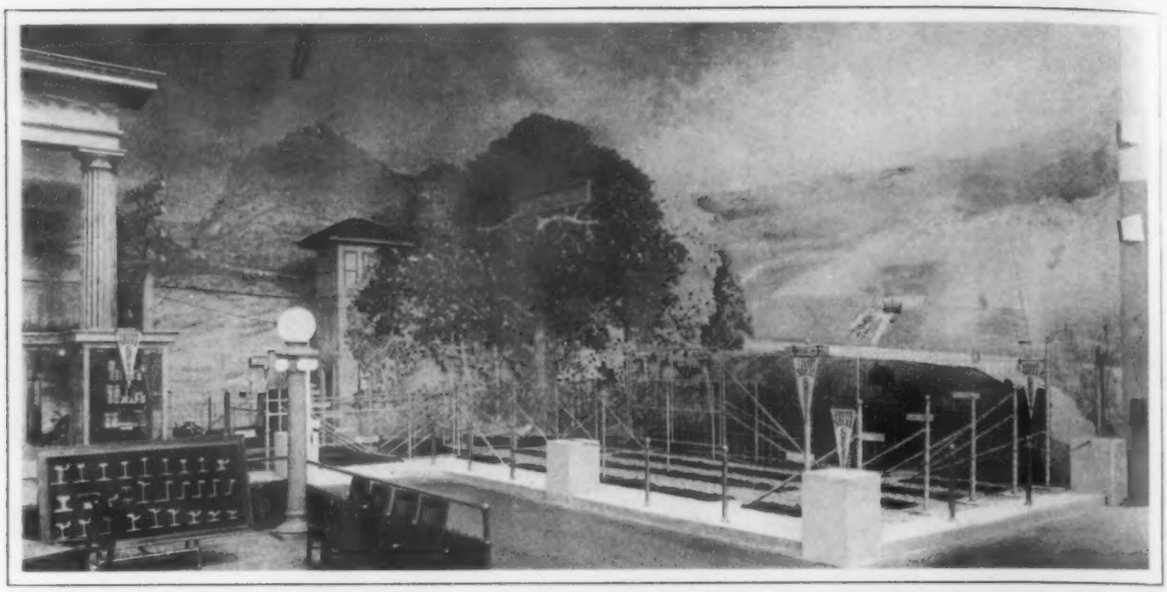
Model of Modern Coal and Coke Plant in Foreground and of Conneaut Harbor in Background; Photograph at Point *b*



Lorain Rail Exhibit from Point *d*, and the Carnegie, Illinois and Tennessee Companies' Products in Background

Photograph at Point *c* of Part of American Bridge Company's Exhibit, including Turntable Base

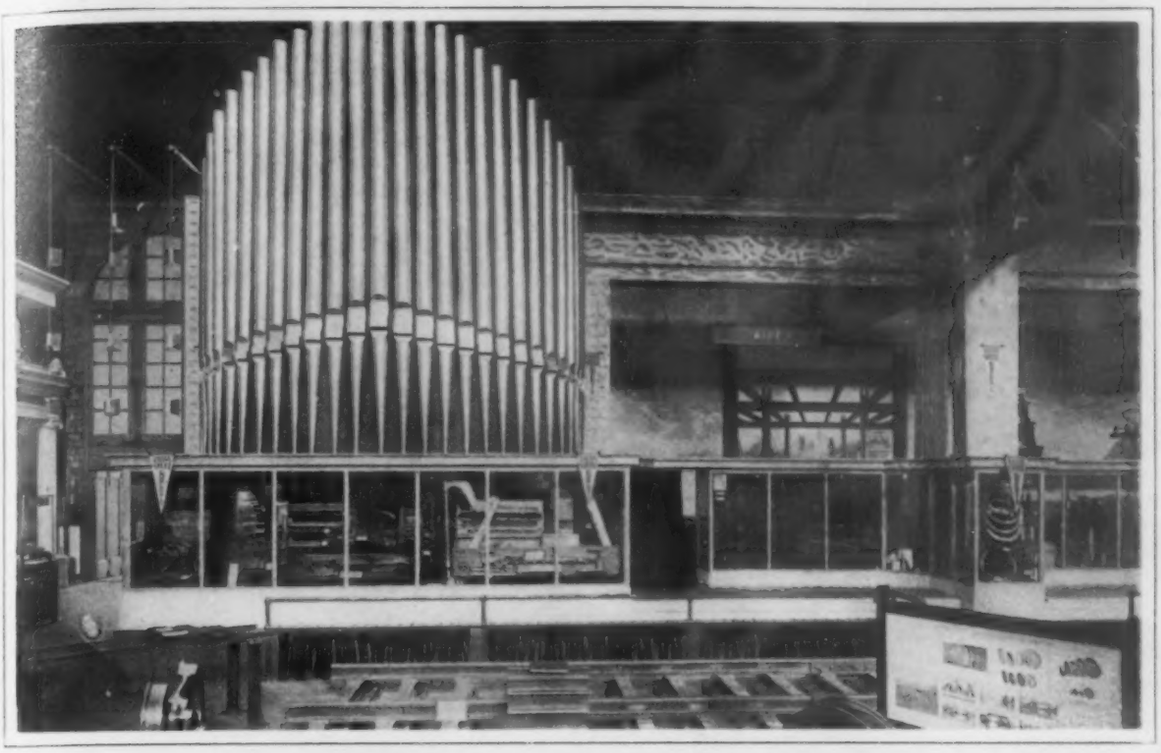
Model Showing Uses of Apollo Sheet Products on the Farm, Photograph from Point *e*



Photograph from Point *f*, Showing Part of the Large Exhibit of the American Steel & Wire Company

Westinghouse Locomotive for Pennsylvania Railroad on an American Bridge Turntable in the Transportation Palace

Part of the Universal Portland Cement Exhibit, Viewed from Point *o*



More of the Uses of Wire as Seen from Point *h*

National Tube and Kewanee Products from Point *m*

Shelby Exhibits from Point *k*

Safety and Sanitation Exhibit from Point *g*, Showing Long Façade of Corporation's Exhibit Space

Duplexing at the Maryland Steel Works*

The Process Adapted to the Removal of Chromium From the Iron—Five Methods of Operation—Fuel Consumption and Quality of Steel

BY F. F. LINES

It is not the intention of the writer to enter into a discussion of the relative merits of the duplex process as compared with the straight scrap and pig-iron process, working under the same conditions, but rather to present in a general way several modifications of the former process, and then describe the method adopted by the Maryland Steel Company, as best suited to local conditions, and also to meet the metallurgical problem presented in the removal from the iron of an unusual constituent—chromium.

The principal factors to be considered in deciding, whether or not duplexing should be employed are:

Chemical constituents of pig iron.
Variety and quantity of steel to be produced.
Relative cost of pig iron and scrap.
Regularity of operation.
Capital to be invested.
An existing Bessemer plant.

Having decided to adopt the duplex process, several combinations may be used, viz.:

Acid-lined converter with basic open-hearth.
Acid-lined converter with electric furnace.
Basic-lined converter with basic open-hearth.
Basic-lined converter with electric furnace.
Basic open-hearth with electric furnace.

The combination of an acid-lined converter with a basic open-hearth furnace is the one most commonly employed, and as it is the one best adapted to the conditions encountered at the plant of the Maryland Steel Company, we will briefly outline the advantages and disadvantages of the different methods of working.

There are two general methods of blowing, as follows:

1. The charge is desiliconized and partly decarbonized in the converter. On account of the difficulty in regulating the percentage of carbon in the blown metal, this method is not desirable where the amount of phosphorus or other impurities to be removed is so low that the duration of the subsequent open-hearth operation is determined by the time required to adjust the carbon to the specification limits. This objection, however, does not hold when the blown metal is to be added to a part charge of pig and scrap previously melted in the open hearth, or when it is to be treated by the continuous process in furnaces of 200 to 300 tons capacity.

2. The converter metal is completely disiliconized and the carbon blown down to about 0.10 per cent. This method of blowing commends itself on account of the regularity of the carbon content of the metal going into the open-hearth furnace, and in certain cases the more complete removal of other constituents.

Two methods of charging the open-hearth furnaces have been employed, dependent upon the facilities for handling the blown metal. In the first plants built it was necessary to send individual Bessemer blows to the open hearth. However, in the plants built recently it has been found advisable to assemble the blows necessary for an entire open-hearth heat in one ladle in the converting department. This method requires larger crane capacity, but has the great advantage of reducing the charging of the furnace to one operation. Both of these methods allow the slag to be kept out of the furnace. In deciding upon the most desirable size of an open-hearth furnace, the question immediately arises as to the type—tilting or stationary; and as this discussion is limited to duplexing, where 8 to 12 heats are tapped in 24 hr., there is little to be said in favor of the stationary furnace. Of late the tendency has been toward the installation of large tilting furnaces of 200 to 300 tons capacity, and while much of the evidence is contradictory, it can be safely stated that these larger furnaces show a saving in the cost of operation and repairs over the smaller ones.

At the plant under consideration, the following points decided the adoption of the duplex process: This plant was originally built to manufacture Bessemer steel rails, the blast furnaces and steel department being proportioned accordingly; the soaking pits in the rail mill were designed to treat the steady stream of hot ingots produced by the Bessemer process. To be able to supply open-hearth

*From a paper to be presented at the one hundred and eleventh meeting of the American Institute of Mining Engineers at San Francisco, Cal., in September. The author is superintendent of the steel department of the Maryland Steel Company, Sparrows Point, Md.

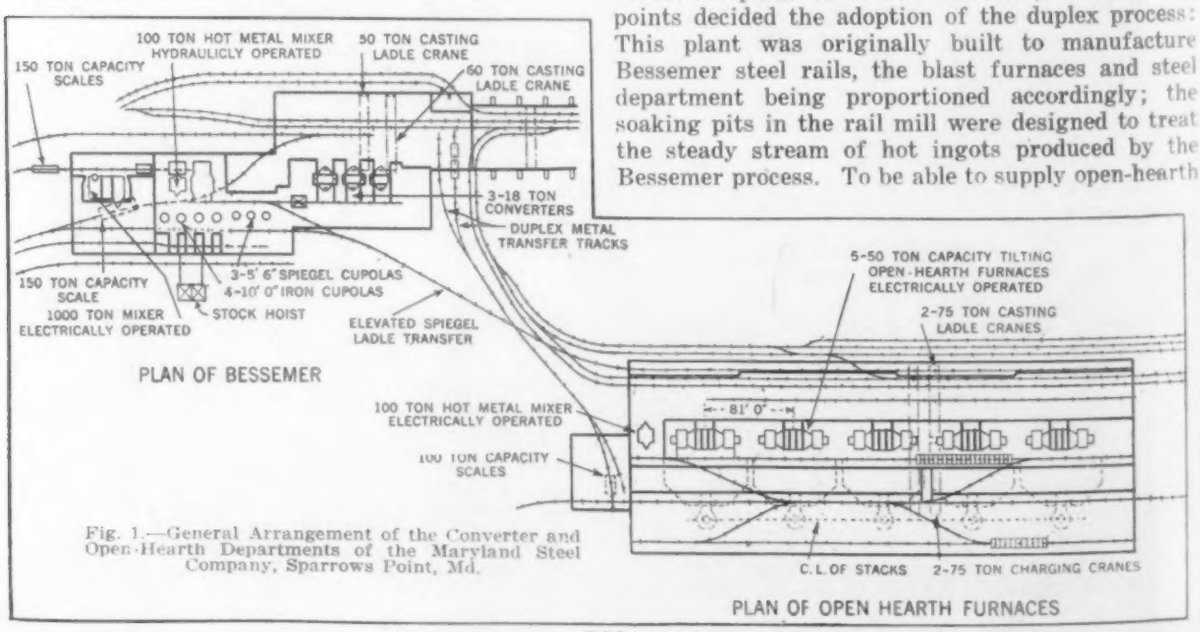

100 TON HOT METAL MIXER HYDRAULICLY OPERATED
50 TON CASTING LADLE CRANE
150 TON CAPACITY SCALES
60 TON CASTING LADLE CRANE
3-18 TON CONVERTERS
DUPLEX METAL TRANSFER TRACKS
150 TON CAPACITY SCALE
1000 TON MIXER ELECTRICALLY OPERATED
3-5' 6" SPIEGEL CUPOLAS
4-10' 0" IRON CUPOLAS
STOCK HOIST
ELEVATED SPIEGEL LADLE TRANSFER
PLAN OF BESSEMER
5-50 TON CAPACITY TILTING OPEN-HEARTH FURNACES ELECTRICALLY OPERATED
2-75 TON CASTING LADLE CRANES
81' 0"
100 TON HOT METAL MIXER ELECTRICALLY OPERATED
100 TON CAPACITY SCALES
C. L. OF STACKS
2-75 TON CHARGING CRANES
PLAN OF OPEN HEARTH FURNACES

Fig. 1.—General Arrangement of the Converter and Open-Hearth Departments of the Maryland Steel Company, Sparrows Point, Md.

steel in place of Bessemer steel, the duplex process was adopted, using five 50-ton tilting furnaces, emptied at each heat. It was also decided at the start to blow the iron to about 0.10 carbon and to assemble the converter charges required for an open-hearth heat in a single ladle in the converting department.

The advantages of this plan for this plant are:

Low first cost and no changes necessary in the existing plant.

The ability to produce all Bessemer steel or all open-hearth steel, with very little change in the volume of finished product.

The blast furnaces may be run to the best advantage, as no limit is set in regard to the silicon of the metal delivered to the converters.

The change to duplex or to straight Bessemer steel is made without expense or loss of time.

When working on open-hearth steel, the Bessemer department is fully employed.

The converting plant, built in 1889, the general arrangement of which with respect to the open-hearth is shown in Fig. 1, is contained in one building. [The paper contains a complete description of the company's steel department and equipment.] The dimensions of the open-hearth furnaces are:

Length between chill plates	31 ft. 2 in.
Length on the metal line	24 ft. 0 in.
Width on the metal line	11 ft. 6 in.

The actual area on the metal line is 175 sq. ft., when made up to hold 50 tons. This area generally averages 220 sq. ft. and with this 60-ton heats are tapped. The regenerators are:

Gas	8 ft. 3 in. by 22 ft. by 10 ft. 4 in., or 1,815 cu. ft.
Air	13 ft. 3 in. by 22 ft. by 10 ft. 4 in., or 2,915 cu. ft.

It will be noted that the dimensions of these furnaces and regenerators are small as compared to most furnaces. The ratios of the bath area and volume of the regenerators per ton rated capacity closely approach the continuous furnace of 200 to 300 tons capacity, in which a part of the furnace charge is tapped at one time.

In September, 1913, owing to a depression in the steel business, and the necessity of operating the plant five days per week, oil was substituted for gas. This did away with the necessity of carrying the gas producers over the week end, with the attendant expense. It was also found that the furnaces could be brought to the proper temperature with oil more quickly than with gas. Fig. 2 shows in detail the special mechanism by which with one movement at the reversal, the burner on one end is withdrawn from the furnace and the oil shut off, and at the same time the burner on the opposite end enters and the oil is turned on.

GENERAL OPERATION

For one duplex heat or one complete open-hearth furnace charge, three fully blown converter charges are poured into one transfer ladle, with or without the addition of iron in the ladle for carbon. In case the iron is not added in the ladle, the necessary carbon for proper action is added in the open-hearth furnace. By this method of assembling the open-hearth charge of blown metal into one ladle in the Bessemer, the complete charging time from the Bessemer to the open-hearth furnace is brought down to about 25 min.

Converter Charge and Scrap.—A typical converter charge is made up of 75 per cent. of mixer metal and 25 per cent. of cupola metal, the latter ordinarily being a mixture of 70 per cent. of pig iron and 30 per cent. of rough steel scrap. The direct iron, containing silicon, 0.40 to 1.50 per cent.; manganese, 0.70 to 0.90; phosphorus, 0.055 to 0.065; chromium, 1.75 to 2.50; and sulphur, 0.01 to 0.10 per cent., is poured from the mixer into 45-ton ladles, and the cupola metal is added in the same ladle. This ladle makes two trips to charge the three converters. On the first trip two converters are charged, both of which start blowing at once. On the second trip, the third converter is charged. By handling the iron in this manner, a minimum skulling of the ladle is obtained. The temperature during the blow is controlled by charging from 4 to 8 per cent. of bloom crops or rail ends through scrap chutes into the converters. This, with the scrap in the cupola metal, gives a total of 14 per cent. of scrap in the charge. The high percentage of scrap added to the charge is allowed on account of the heat developed by the chromium in its oxidation during the blow. From our practical experience, it is estimated that its heat of oxidation is one-half of that of silicon.

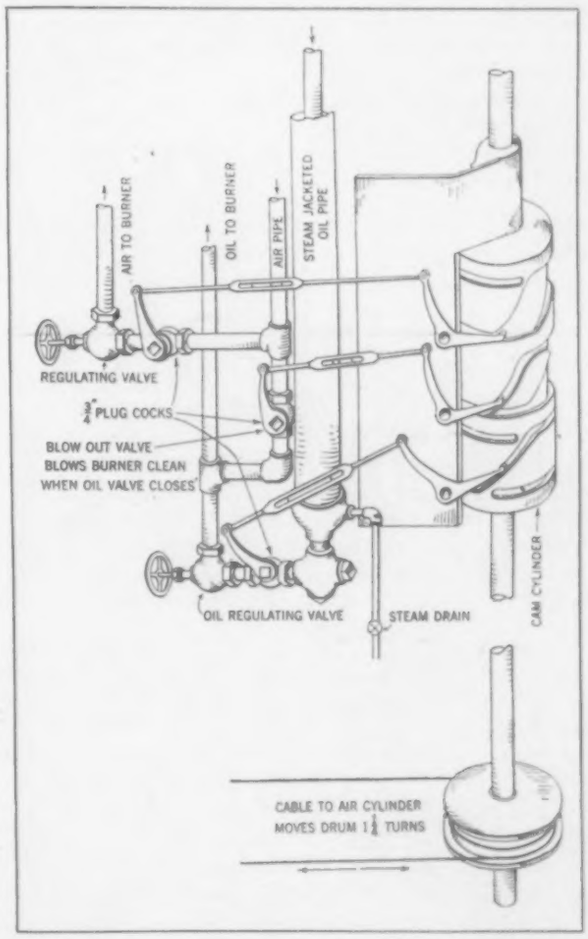


Fig. 2.—Mechanism for Controlling the Operation of Oil Burners

Method of Charging the Open-Hearth Furnaces.—As soon as the converter charges are blown they are poured into the transfer ladle, which is placed on a truck and taken to the open-hearth, where it is weighed, hoisted by the charging crane, and carried to the front of the proper furnace. No runner is used in charging the metal into the furnace, each transfer ladle being fitted with an 18-inch spout to direct the stream of metal from the nozzle. The ladle is placed within 2 ft. of the furnace door and the nozzle plate is knocked off. The helper, standing on a small platform on a level with the nozzle, picks out the small clay plug with a short hook, loosens the sand in the nozzle, with which the nozzle is closed, and the stream of metal spurts out at right angles to the ladle through the furnace door. As soon as all the blown metal has run out of the

nozzle, and the slag appears, the ladle is tilted back and taken to the transfer truck, where the slag contents are dumped into standard-gauge steam-dumping slage bowls, and the ladle is light-weighed. The slag in the bowl is also weighed, and in this way the weight of the metal going into the furnace is established.

The time for running a heat from the ladle varies with the size of the nozzle, depending upon how many heats have been made through the same nozzle. It is the usual practice to take from six to eight heats off each nozzle. The total time from the pouring of the metal out of the converter nose to transferring all to the open-hearth furnace is from 22 to 28 min. There are few cases in which trouble is encountered in opening the nozzle on the transfer ladle. If trouble does occur, the metal is poured over the top of the ladle, or in case of steel in the nozzle, it is opened with a stream of oxygen. When pouring over the top of the ladle considerable acid-converter slag is carried into the furnace, which interferes with the removal of the phosphorus and requires large lime additions for neutralizing.

that the blown metal must not finish at too high a temperature, nor must the carbon be blown below 0.08 per cent., otherwise, in addition to an excessive blowing loss, there will result a violent ebullition in the transfer ladle when the recarburizing iron is added. This results in a mechanical loss due to boiling over the top of the ladle, and a loss in skulling of the ladle due to a lowering of the temperature of the steel. An advantage claimed for recarburizing in the ladle is that the addition of iron to the ladle reduces some iron from the slag back into the metal. However, a number of tests have been made on this point, and they do not show any appreciable reduction of FeO in the converter slag.

	Slag from converter, per cent.	Slag in transfer ladle after iron added, per cent.
SiO_2	22.80	24.60
FeO	24.16	22.60
MnO	7.70	7.00
Cr_2O_3	27.65	26.10

We now have in the converter or transfer ladle 60 tons of metal of the following composition:

	Per cent.
Carbon	0.70 to 0.90
Manganese	0.10
Phosphorus	0.065
Sulphur	0.040
Chromium	0.30 to 0.35

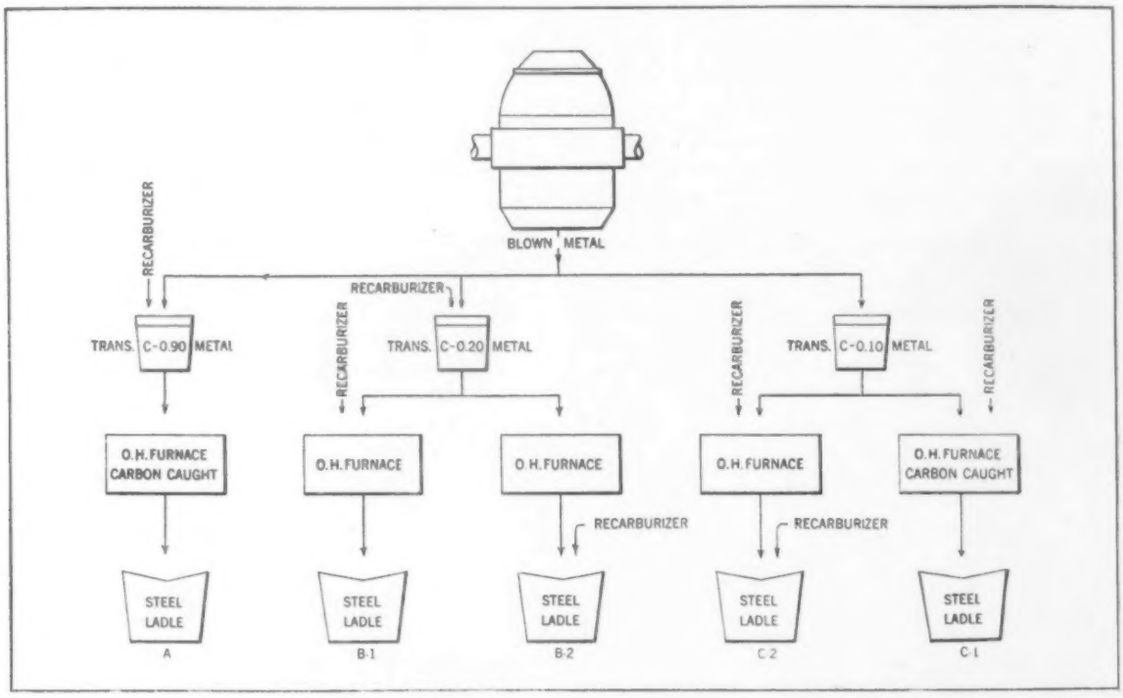


Fig. 3—The Different Possible Methods of Duplexing Shown Graphically

Before charging, a mixture of 1 to 2 per cent. of burnt lime and 1¼ per cent. of roll scale is put on the bottom. It is desirable that the lime and scale have sufficient time to become thoroughly cut up before the duplex metal goes into the furnace. The time elapsing between tapping of one heat and charging the next varies from 20 to 60 min., an average of about 30 min. As soon as the duplex metal is in the furnace, a test is taken and sent to the laboratory, where the carbon is determined by direct combustion. The time elapsing between taking the test and obtaining the results from the laboratory is from 20 to 25 min.

TREATMENT IN THE OPEN HEARTH

The treatment in the open hearth depends upon the carbon in the metal from the converters, as explained in the following description of the individual methods, outlined in Fig. 3.:

Method A.—The iron added for recarburizing the blown metal is taken direct from the mixer, and is about 20 per cent. of the total in the ladle. This method requires, with the particular iron dealt with, This metal as soon as it goes into the open-hearth furnace begins to take action. The metal loses about 10 points carbon and the phosphorus is down to 0.008 to 0.02 per cent. in the first test; the heat is, chemically, ready to tap. In the meantime, if the temperature of the bath is sufficient to go out on the first test, the melter has the tap hole open, the ladle hung, and if the analysis of the preliminary is within the limits the heat is tapped. In case the bath is not of the proper temperature, or the carbon too high, another test is already being worked by the laboratory, as the helper takes a test out of the furnace every 20 min. On receipt of the second result, if within the limits, the heat is tapped. The manganese, with this method, is generally added in the ladle, as well as the 50 per cent. ferrosilicon. If 11 per cent. ferrosilicon is used, it is added in the furnace 5 min. before tapping. A great many heats are of sufficient temperature to carry cold spiegel, added in the furnace 5 min. before tapping. Forty-five minutes is a good average time for charging metal into the furnace to tapping, and there is no doubt that this method has the advantage of rapidity and ease of operation, there being no further metal additions to the furnace, with their attendant delays and boiling effects in the furnace.

The disadvantage of this method is that the time necessary to determine the carbon in the sample is of such duration that by the time the results are known the metal in the furnace has not the composition it had when the test was taken, and as the carbon does not drop uniformly, heats are tapped from time to time which do not come within the prescribed carbon limits for rail steel. This is of particular importance to this plant, as we have no other product into which heats unsuitable for rails can be rolled.

Methods B-1 and B-2.—These in practice were found to give unsatisfactory results, due to the metal skulling in the transfer ladle, and the fact that the small percentage of carbon often boiled out in the open-hearth furnace, before it was ready to tap, necessitating further recarburizing.

Method C-1.—The method of recarburizing in the open-hearth furnace up to 0.70 to 0.90 per cent. carbon and catching the heats "coming down" has no advantage, except that the handling capacity of the transfer ladles is increased by allowing them to be completely filled with blown metal, the recarburizing pig iron being subsequently added to the charge in the furnace.

Method C-2.—This method has been found to give more uniform carbon results in the finished steel. The iron is blown as previously described, but there is not the necessity of keeping the temperature within such close limits as when recarburizing in the converter ladle. The heats can be blown "younger"; the blown metal going into the furnace has the following composition:

	Per cent.
Carbon	0.10 to 0.15
Manganese	0.10
Phosphorus	0.06
Sulphur	0.04
Chromium	0.20 to 0.30

The furnace, as in the other methods, has been charged with 2 to 3 per cent. of burnt lime and 1¼ per cent. of roll scale. This requires 30 min. before the duplex metal is charged. As soon as the blown metal is in the furnace, about 10 per cent. of the molten pig is added, which causes the previous dead soft metal in the furnace to take action. As soon as this iron is through the bath a test is taken, which should show approximately:

	Per cent.
Carbon	0.15 to 0.30
Manganese	0.08
Phosphorus	0.008
Sulphur	0.05
Chromium	0.20 to 0.30

If the heat is hot enough and of the proper analysis, molten spiegel containing 20 per cent. of manganese, from the Bessemer cupolas, with enough molten iron from the open-hearth mixer to give the correct manganese-carbon addition to the heat, is poured into the casting ladle as the heat is tapped from the furnace. A good average time for such heats through the furnace is 1½ hr. This, with 40 min. between heats, gives 10 heats of 62 tons, or 620 tons per furnace, in 24 hr. In following this method, the metal in the furnace must be at a higher temperature than required for the first method, on account of the cooling effect of the addition of the recarburizer in the casting ladle. This requires the furnace to be carried at a higher temperature, with a corresponding shortening of its life. The percentage of lime added is necessarily higher on account of the necessity of carrying a more basic slag to counteract the addition of the recarburizer iron in the casting ladle, with its strong tendency to reduce the phosphorus in the slag back into the metal. A typical slag contains: SiO_2, 14 per cent.; FeO, 16; MnO, 4; Cr_2O_3, 7; CaO, 45 and P_2O_5, 0.75 per cent.

OUTPUT AND FUEL CONSUMPTION

The maximum week's production at this plant averaged 600 tons per furnace in 24 hr. The maximum daily output per furnace has been 694 tons.

In case it should be necessary to duplex on all five furnaces to meet the increased blast-furnace output, allowed by the conditions of the market demand for steel products, the limiting factor in this plant would be the capacity of two pit cranes to handle the steel. In the final analysis of any method or furnace, the correct factor of efficiency or speed is the tons of steel made per hour per square foot of hearth area of the furnace. From weekly averages made at different times, we find this to be 0.11 ton per hour per square foot of hearth area.

When the furnaces were burning gas, no actual figures on coal per ton of ingots on duplex metal were available, but we are able from different runs to give some figures very close to the actual. The figures given for oil are actual meter readings.

	Duplexing, including heating up	Cold charge, including heating up
1913		
Coal per ton of ingots, lb.	235	1,030
Oil per ton of ingots, gal.	16	40
1914		
Coal per ton of ingots	No coal used	
Oil per ton of ingots, gal.	12.8	50

The results in 1914 were obtained under very unsatisfactory conditions, the plant operating only five days per week. Deducting the oil used in heating up the furnaces and considering the actual time the furnaces were making steel, we have an average of 9.3 gal. of oil per ton of ingots. Stated in terms of heat units per ton of ingots, we have 9.3 gal. of oil at 150,000 B.t.u. per gal., or 1,395,000 B.t.u.; assuming the available heat in the gas per pound of coal to be 10,000 B.t.u., we have $\frac{1,395,000}{10,000}$, or 139.5 lb. of coal per ton of ingots.

LIFE OF FURNACES AND THE LOSSES

On account of not duplexing exclusively on any of the furnaces, the following average for three years' operation includes about 33 per cent. of the heats made by the pig-iron and scrap method; Furnace roofs, 300 heats; furnace fronts, 97 heats.

The average working time of three furnaces during this period was 5½ days per week. During this time the plant had three extended shut-downs. From observations made as to the wear of the furnaces when duplexing for different periods, we are safe in stating that the furnaces duplexing exclusively will give 500 to 600 heats to a roof, and from 150 to 200 heats to a front.

In making comparisons between the losses in the duplex process and the cold-charge process, the fact must be remembered that the difference is due to the elimination of the carbon, silicon, etc., in the converter, whereas the scrap in the ordinary open-hearth process has already withstood such a loss in its original conversion.

To satisfy the slag in Bessemer conversion 1.75 per cent. of the metallic iron is oxidized in the converter. This and the small loss in "shot" are the only losses sustained in the duplex process not common to both processes working with the same materials. The average loss from the Bessemer converter charge to open-hearth ingots for 1914 was 12.57 per cent.

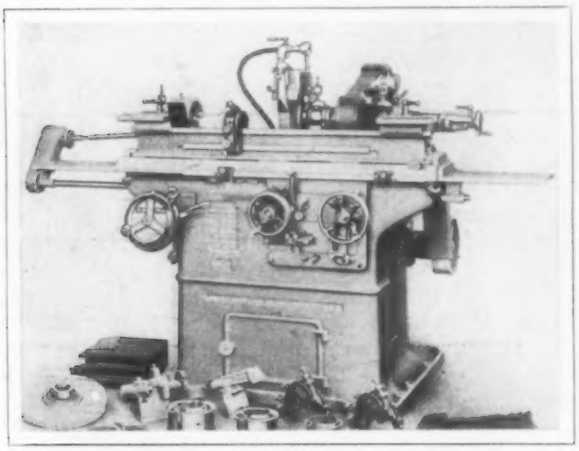
QUALITY OF THE STEEL

With the introduction of the duplex process, there arose some criticism as to the quality of the resultant steel. As rail manufacturers we have had a most favorable opportunity of watching the behavior in track of 250,000 tons of duplex steel and 125,000 tons of ordinary open-hearth. The results of observations of these rails, of practically the same chemical composition and made under uniform conditions of rolling-mill practice, warrant the statement that there is no difference in the quality of the two products.

NEW PLAIN GRINDING MACHINE

A Self-Contained Constant-Speed Drive Type Handling Work 32 In. Long

The No. 11 plain grinding machine, with a capacity for taking work up to 32 in. in length and 6 in. in diameter, is the latest addition to line of single-pulley constant-speed drive machine tools built by the Brown & Sharpe Mfg. Company, Providence, R. I. In addition to the usual advantages of a self-contained drive, the method of its application



A Recently Developed Plain Grinding Machine Equipped with a Special Self-Contained Drive of the Constant-Speed Type for Handling Work Up to a Maximum Length of 32 In. and 6 In. in Diameter

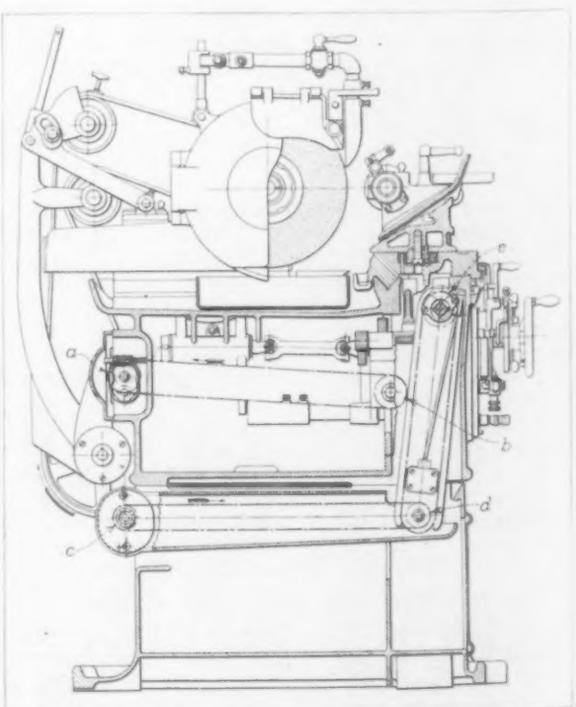
is particularly interesting because of new ideas in the design of the drive for the various parts of the machine.

Power is transmitted to the machine through a main driving shaft running in two large taper roller bearings bolted to the rear of the machine. This shaft, running at 900 r.p.m., is driven with a 3-in. belt from a simple countershaft containing one tight and loose pulley and one driving pulley to a large pulley located on the end of the main driving shaft. A large pulley located centrally between the two roller bearings on the main driving shaft drives the wheel spindle with a 3-in. belt running over two idler pulleys. Changes in wheel speeds are obtained by split pulleys on the wheel spindle that can be quickly interchanged without removing the belt. The idler pulleys run on taper roller bearings supported in a heavy swinging bracket constructed so as to follow the transverse movement of the wheelstand, thus keeping the desired tension upon the driving belt regardless of the position of the grinding wheel and insuring accurate feeding of the wheel under all conditions. The slack in the belt due to the difference in diameter of the wheel spindle pulleys when changes in wheel speeds are made is taken care of by the top idler pulley which has a separate adjustment, making it possible for the operator to place any tension on the wheel spindle driving belt.

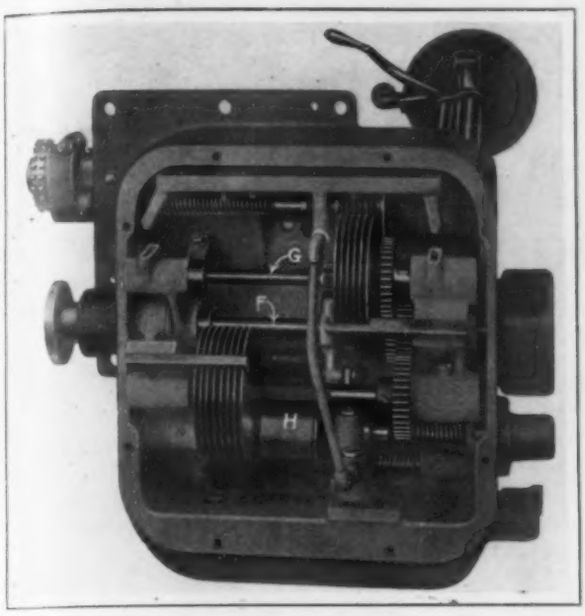
The table traverse movement is driven by a sprocket, *a*, located on the speed case and the driving sprocket *b* located on the table traverse reversing mechanism, which is self-contained in a case fastened into the bed of the machine from the front. The headstock is driven from the speed case by a sprocket, *c*, to a double sprocket, *d*, acting as an idler, to a hardened splined sprocket, *e*. A splined shaft supported in bronze bearings under each end of the work table sliding in the splined sprocket *e* drives, through a chain and sprockets, a telescopic shaft and universal joints which in turn transmit power to the headstock chain. The splined and telescopic shafts are clearly shown at the end of the table in the front view of the machine. The work driving plate is mounted upon a sprocket running on taper roller bearings around a fixed spindle which firmly holds a dead center in such a manner as to become practically an integral part of the head. All chain drives throughout this machine are of the silent type eliminating slippage, but providing the desired flexibility and giving a smooth steady drive to the work. Easy means of adjustment are provided in all cases. The tapered roller bearings used are of an adjustable type, and are lubricated by grease cups.

An important step in the evolution of this machine was taken a short time ago, when a simple and efficient speed and feed change mechanism, which was described in *The Iron Age* at the time, was developed. The drive from the main shaft of the machine to the sprockets on the speed case that drive the headstock and table is of a powerful multiple-friction disk type. It enables the operator to start and stop the work or table movements easily without shock and gives practically universal choice of independent speeds and feeds.

One of the illustrations shows the interior of the speed case. From the main driving shaft, F, power is transmitted through gears to two separate driving shafts, G and H, running at a constant speed. These shafts carry series of hardened steel disks ground slightly convex and each meshing with another series of hardened steel disks. The latter disks have a rim at their periphery, bringing the point of contact always at their extreme edge. The driving shafts are mounted in swinging brackets pivoted on the main driving shaft bearings. They are swung toward or away from the driven shafts carrying the driving disks toward or away from the center of the driven disks, thus obtaining the desired changes in the speed of the work or the feed of the table by decreasing or increasing the radius of the driving disks. A continuous flow of oil from a pump di-



Drawing Showing the Arrangement of the Drives for the Table Traverse and Headstock



View of the Speed Case with the Cover Removed Showing the Arrangement Employed To Vary the Speed of the Work or the Feed of the Table

rectly connected to the main driving shaft furnishes lubricant for the entire case.

The control of the speed case is governed by three levers grouped around a dial mounted at the left of the machine within easy reach of the operator. The round lever to the right is marked "Head" and controls the headstock or rotation of the work. Any desired number of revolutions may be obtained, ranging from 82 to 412 r.p.m. A second round lever, marked "Table," at the left, changes the rate of table traverse. The dial is graduated to read in inches per minute. Any desired change from 13 to 181 in. per min. may be obtained. The third and longer lever serves to stop and start both work and table instantly and simultaneously without stopping the grinding wheel.

Another new feature found in this machine is the independent automatic cross feed which enables the wheel to be fed into the work without traversing the table. This feature is useful when the portion of work to be ground is not as great as the width of the grinding wheel. This independent automatic cross feed is driven from the table traverse mechanism and operates the ratchet arrangement of the regular automatic cross feed. The full number of changes of feed that can be made with the regular cross feed mechanism are thus available. These may be increased or decreased by changing the speed of the table traverse mechanism with the table traverse feed change mechanism, giving practically a universal selection of feeds from the coarsest to finest that are ever required. A positive safety lock is provided to prevent throwing in the table traverse when the independent automatic cross feed is in operation.

Reductions in list prices of practically all sizes and types of Edison Mazda multiple lamps were put in effect April 1 by the Edison Lamp Works of the General Electric Company. On regular straight side and round bulb lamps from 10 to 250 watt sizes the reductions range from 3 to 20c. per lamp, according to the size. The new concentrated filament vacuum lamps of 25, 40 and 60 watt sizes now list at only 5c. per lamp more than the regular lamps of corresponding sizes. On the gas-filled, multiple lamp of 100 to 1000 watt sizes the reductions range from 50c. to $1 per lamp. The introduction of gas-filled lamps has been exceptionally rapid. Over 1,000,000 are already in use.

Book Reviews

Engineering Directory for 1915. In two volumes: Part I, 893 pages, 4 x 6¾ in., leather; Part II, pages 468, 8 x 10¾ in., cloth. Published by the Crawford Publishing Company, 537 South Dearborn street, Chicago, Ill. Price, Part I, $5, or both parts together, $6.

In previous years this directory has been published in one volume—a small red book familiar to the trade. The 1915 edition is divided in such a way that the selling or mailing lists are contained in Part I, while the buyers' section or classified directory of manufacturers is contained in Part II.

In Part I are contained lists of dealers and jobbers of mill, steam, mine and machinery supplies, and the jobbers of plumbing and heating supplies; also lists of jobbers of hardware, manufacturers' agents, manufacturers of engineering goods, mill supplies and machinery; architects, waterworks, gas companies, purchasing agents of steam railroads and cement mills. In addition there are new lists of cotton, woolen, flour and sugar mills; lumber manufacturers, woodworking plants, paper and pulp mills, refrigerating plants, brewers, iron and steel mills, cotton-oil mills, cotton gins and compressors, stoves and ranges, and boots and shoes.

Part II is essentially a buyers' hand-book. It contains a classified directory of the manufacturers of mill, steam, mine, contractors, plumbing, heating, lighting and allied lines of supplies and machinery. The names of manufacturers are classified under approximately 4000 headings, with trade names of goods given in alphabetical orders. The book also contains an alphabetical list of these manufacturers, giving street addresses and specifying the kind or principal products manufactured. A 20-page cross-index simplifies the matter of locating any particular line or specialty, a feature which facilitates the location of the manufacturer when only the trade name of goods is known.

Metal Statistics, 1915. Pages 344, 4 x 6¼ in.; cloth. Published by the American Metal Market and Daily Iron and Steel Report, New York. Price, 50 cents.

The value of this little book of statistics, now in its eighth year, has been fully demonstrated to those who have had occasion to make even infrequent reference to past prices and production figures of the non-ferrous metals and of iron and steel and their finished products. Included also are similar statistics for iron ore, coke, scrap, ferromanganese, etc., all in tabular form, permitting comparison with previous years at a glance. In view of recent conditions the data given on spelter and antimony are of especial interest. In the case of the former it is shown that the highest prices of any year since 1885 do not equal those of to-day, while not since 1907 have the present prices for antimony been equaled. To the wide field previously covered have been added coal, petroleum and cement.

The T. L. Smith Company, Milwaukee, Wis., has issued a booklet, entitled "First Lessons in Concrete Work." It is intended to furnish practical and specific directions as to the construction of floors, sidewalks, walls and other light concrete work, with information as to methods of mixing concrete, its ingredients and the proportions used. Some data on the cost of concrete construction in its simplest forms are included. The booklet includes numerous illustrations and drawings of the different types of forms and methods of reinforcing employed.

Handbook of Ball Bearings for Automobiles

The Gurney Ball Bearing Company, Jamestown, N. Y., has issued an automobile edition of its ball bearing handbook. This has been compiled to give the automobile engineer a convenient and reliable reference book on approved ball bearing engineering as applied to any part of any type of motor vehicle, and it is virtually a textbook. Illustrations of the characteristics of the company's bearings; instructions on mounting them; general data on bearings; tables of the stresses on the various parts of the cars and the bearings to be used are included in the 140 pages.

SPECIAL WELDING MACHINES

Electric Spot and Butt Types Developed to Meet Particular Requirements

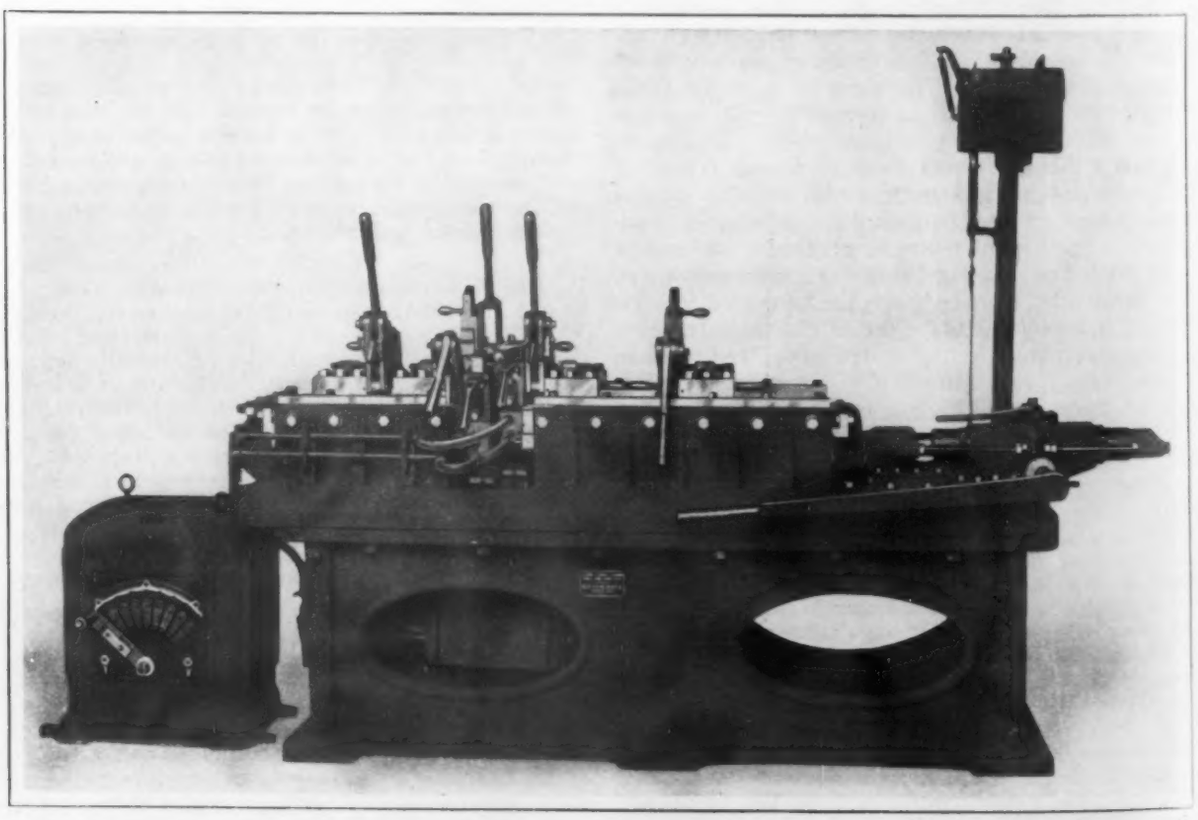
The Toledo Electric Welder Company, Cincinnati, Ohio, has developed two special electric welding machines. One of these is what is known as the butt type and was built for the Saco Lowell Shops, Biddeford, Maine, for use in connection with manufacture of shafting for spinning machines, while the other, a spot machine, is designed for welding work that is too heavy to be handled conveniently.

In the construction of spinning machines it is necessary to turn the shafting, which varies from ¾ to 1¼ in. in diameter, in lengths of not more than 2 ft. to have them accurate. As the shaft must be made up in lengths of from 30 to 40 ft., the pieces were formerly drilled and tapped at the ends, and threaded pins inserted to hold them together. It is stated that this arrangement was not altogether satisfactory, as the alignment and strength required could not be secured. The specifications covering the machine for welding these pieces together required that a shaft 40 ft. long must be in alignment and concentric to within 0.004 in. The clamping mechanism employed was made massive with a view to eliminating spring in any part after the pieces were clamped in place and the necessary pressure applied to force the stock together. The stock is clamped in position by two sets of steel clamping dies on each side arranged to clamp the stock at two points. The clamps are adjustable throughout the entire length of the slides, which operate in V-ways with adjustable tapered gibs for taking up wear. Four floating copper dies convey the current to the rods and are brought up to the work after the stock is clamped in position.

After the work is clamped in position the electric current is turned on, and the ends of the rods

A Welding Machine of the Spot Type by Which It Is Possible To Make Three Welds at Different Places without Changing the Position of the Stock

are heated to the welding temperature in approximately 15 sec. The ends of the stock are forced together by a 5-ton hydraulic ram which is operated by a pumping motion of the lever handle shown at the front of the machine. The dies are withdrawn from the rods and the clamps that hold the stock are next released, the operator now being ready to make the next weld. The clamping of the stock and the actual welding is done in between



An Electric Butt Welding Machine Designed Especially for Welding the Shafting Used in the Construction of Spinning Machines Which Varies from ¾ to 1¼ In. in Diameter

50 and 60 sec., and the small flash left on the stock where the weld is made is removed in a lathe.

The machine has a maximum die opening 3½ in. long and the centers of the dies are 35½ in. above the floor. The floor space required by the machine is 29 x 80 in., and the over-all hight is 44 in. The approximate shipping weight is 7500 lb.

The spot welding machine was designed to do heavy work. As the parts to be welded were too heavy to be conveniently handled, it was necessary to make the welds without changing the position of the stock. For this work three different kinds of dies are used without changing the position of the stock after it is placed on the lower horn of the welding machine. The upper part of the machine is arranged with the die point mounted on a swiveled head, and after a weld is made with one die the next is swung around to strike the stock in a different place and it, in turn, is succeeded by the third die, which makes a weld in a still different spot, all of the welds being made within a radius of 4 in. The actual time consumed in making the three welds including the shifting of the die points is 12 sec. The machine is designed for welding 5/16-in. stock together, and takes the place of the riveting operations formerly employed. It is stated that the time required for drilling, reaming, countersinking and setting the rivets was from 10 to 12 min. each. After the welds have been made the stock is removed and another piece inserted, the order in which the welds are made being reversed in this case.

Carnahan Patents on "Ingot Iron" Sustained in an Ohio Suit

A final decree in the suit of the International Metal Products Company against the United Steel Company of Canton, Ohio, was entered in the United States District Court, northern district of Ohio, at Cleveland, March 23. In 1911 the International Metal Products Company, which is controlled by the American Rolling Mill Company of Middletown, Ohio, brought the suit, alleging infringement of its patents Nos. 940,784 and 940,785 covering "improvements in iron manufacture" and "improvements in ingots" involved in the manufacture of what it designates as "pure iron" or "ingot iron." When the matter came at length before the court at Cleveland, the United Steel Company requested a conference with the plaintiff. This was held and resulted in a settlement on the basis of a payment of $176,000 in damages and royalties and a further payment of royalties on all similar material manufactured during the life of the above patents under licenses to be issued by the International Metal Products Company to the United Steel Company and its associated interests, the Stark Rolling Mill Company and the Berger Mfg. Company. An acknowledgment of the validity of the Carnahan patents covering "basic pure iron" and all its alloys was made a part of the settlement. R. P. Carnahan, Jr., the inventor of pure iron, is the vice-president of the American Rolling Mill Company, entering its service about 15 years ago as superintendent of the open-hearth department.

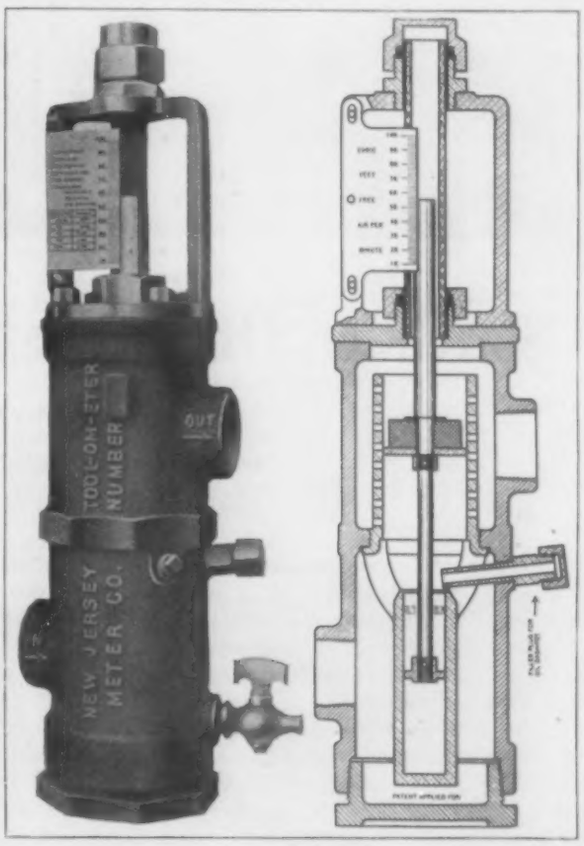
The Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, is manufacturing a line of presses for use in making shrapnel shells. The operations include the piercing of the billet to form the steel shell, reducing the thickness of the wall of the shell and increasing its length, forging the disks to cover the powder chamber, forming the fuse sockets and protecting plugs, nosing the shells and performing the banding operation.

The Busch-Sulzer Bros. Diesel Engine Company, St. Louis, Mo., has taken an order for a 225-hp. Diesel engine for operation as an auxiliary unit, direct connected to a 160-kw. generator, in the power station of the Red Cedar Valley Electric Company, Rice Lake, Wis.

Pneumatic Tool Air Consumption Meter

A compressed air meter has been brought out by the New Jersey Meter Company, Plainfield, N. J., called the Tool-om-eter, to measure the air used by pneumatic tools. It can, of course, be used to meter the flow of air in a pipe or hose and thus the air consumption of a machine. It has a capacity of 10 to 100 cu. ft. of free air per min. and the readings are given directly on a scale.

The meter has a moving element which floats on the air. It comprises a weighted piston in the upper or metering chamber, a small piston in an



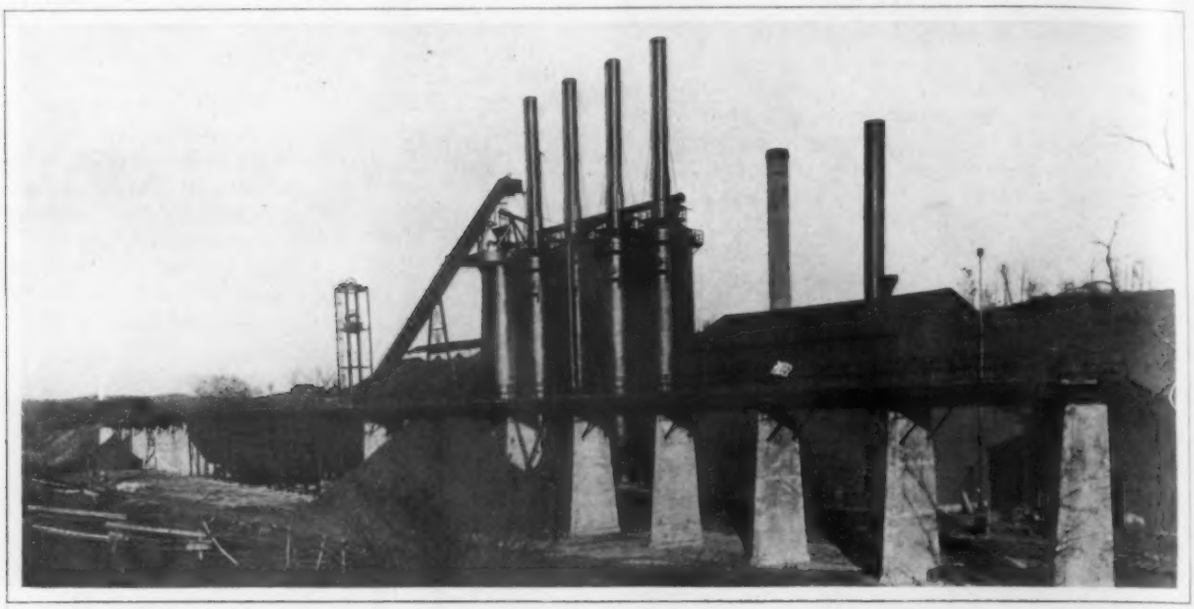
Exterior and Sectional Views of a Compressed Air Meter Designed Chiefly for Measuring the Air Used by Various Pneumatic Tools

oil dashpot cylinder and a rod joining them. This rod extends upward and moves inside the sight glass at the top of the meter. Air enters at the lower left opening and passes through ports into the interior of the metering cylinder. There is a large number of the ports, which are small uniformly spaced holes, and the air to pass to the outlet chamber lifts the piston and exposes as many as may be needed.

A Motor-Driven Ball Bearing Grinding Machine

For use in toolrooms and for handling a variety of work in machine shops, the Dillon Electric Company, Canton, Ohio, has brought out a motor-driven ball bearing grinding machine. The motor, specially designed for the machine, is inclosed and is furnished for use on direct-current circuits of 110 and 220 volts, and for one, two and three-phase 60-cycle alternating current at voltages of 110 to 550. The use of a large spindle running in ball bearings is relied upon to insure true running of the wheels. The wheel guards, which are of heavy construction, inclose approximately one-half of the circumference of the wheels and both sides practically down to the spindle. The grinding rests have broad lips in front and at the outer side of the wheel, and are fastened to the pedestal by bolts passing through slots which provide for the adjustment for radial wear of the wheels.

Reinforced-Concrete Bents of Ore-Storage Trestle Serve as Partitions



Southern Ohio Blast Furnace Modernized

Improvements to Stack of Jackson Iron & Steel Company—New Top, Skip Hoist, Steel Bins and Storage Trestle

Extensive improvements made recently at the furnace of the Jackson Iron & Steel Company, near Jackson, Ohio, include the installation of new steel bins and storage trestle, a single-track skip bridge, a scale car, an entire new top for the furnace, and a locomotive crane.

The storage trestle is single track, with steel stringers resting on steel bents spaced 27 ft. on centers, the bents being designed strong enough to carry the entire load but incased in concrete to act as a partition wall between the ores, as well as to prevent corrosion of the steelwork. The trestle is designed for two engines, each weighing 195¼ tons, and a load of 5500 lb. per ft. It has a grade of 0.5 per cent. and walks with railings on both sides. The approach trestle to the bins, which is approximately the same design as the storage trestle, is on a 2 per cent. grade and has a switch with a second track leading to the coke bin. Ties are used under the railroad rails in the three panels extending from the switch point to the frog. The railroad rails rest directly on the stringers throughout the balance of the structure.

The ore, stone and coal bins are all designed alike, so that they can be used interchangeably if it is found convenient during operation. There are five panels of these bins north of the coke bin and four panels south of it, the coke bin being opposite the furnace. Each bin is 12 ft. long, 15 ft. wide and about 26½ ft. from the stockhouse floor level to the rail, and will hold approximately 145 tons of ore. The slope of the bottom of the bins is 55 deg. with the horizontal. They are single track, with the coke track along the side. In each 12-ft. bin there are three pairs of gates, each gate giving an opening 18 in. square. By opening one pair of gates an opening 18 x 36 in. is provided. The scale car runs under these bins and the gates can be operated from the scale car by hand. The gates are weighted so that they open very easily and as they open the face of the gate plate moves away from the ore. There is also provided an attachment by which the handle may be moved through a small space without moving the gate, so that when the handle starts the gate, the gate moves suddenly, as though struck by a hammer.

The scale car was built by the Atlas Car & Mfg. Co. and has a capacity of 85 cu. ft. It is equipped with Fairbanks scales, six weigh beams and one tare beam, with a total capacity of 12,000 lb. It is provided with one Westinghouse mining type motor, with standard drum controller and resistance. Provision is made for operating this car by one man and the arrangement of the operating machinery is very convenient. The scale beams and fingers, controller, car brake, lever for operating the scale car doors and the lever for the ore bins are all within easy reach of the operator from his position.

The coke bin is double track, 40 ft. long, 32 ft. wide and 26½ ft. high. The slope of the bottom of this bin is 52½ deg. with the horizontal. There are three walkways, one between the tracks and the other two outside, each of the latter being provided with a railing 4 ft. high. This railing consists of nine pieces of 2 x 4-in. stock, so as to hold the coke when being unloaded with a fork from a box car. The gate for this bin gives an opening 30 in. wide and 2 ft. high. It is operated on approximately the same principle as the ore bin gates. The coke, when released by the opening of the gate, runs down a chute the bottom of which is a plate with a large number of ½-in. holes. The coke dust flowing through these holes falls into a dust chute, which carries the dust into the skip pit at a place where it can be easily removed. The discharge spout from the coke bin discharges the coke into the hopper, as does the scale car, this hopper discharging the ore, coke, etc., directly into the skip car.

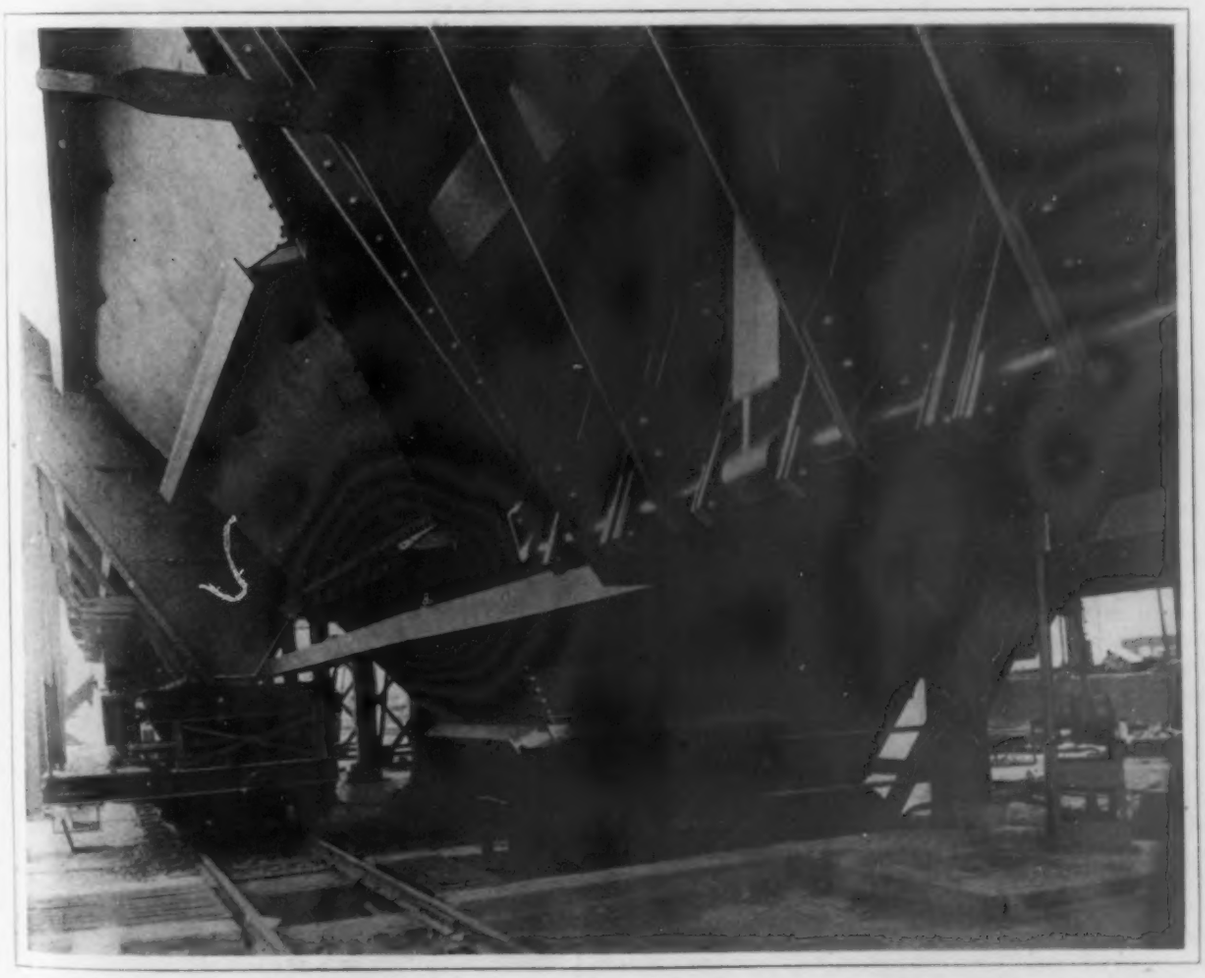
The skip pit is built of concrete reinforced with steel bars, the walls and bottom being waterproofed with four layers of Hydrex felt and waterproofing compound. It is made to extend 6 ft. beyond the

coke bin, which will enable the bucket from the locomotive crane to be dropped into the pit and pick up the coke screenings and load them on a car.

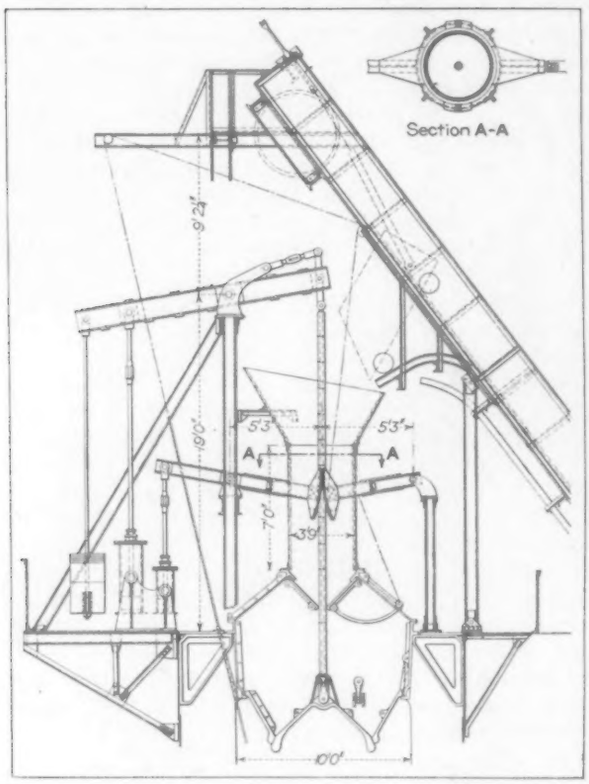
The skip bridge is single track and of through girder type construction, the skip car having a capacity of 85 cu. ft. The car runs on 100-lb. railroad rails which are carried on cross channels riveted to the skip girders. On one side of the skip bridge a stairway is provided from the stockhouse level to the furnace top. This skip bridge is carried on an A frame 30 ft. from the furnace and on a pair of steel columns at the top of the furnace. These latter columns are pin connected so that there is no side thrust against the furnace shell. There is an apron plate underneath the skip bridge throughout its entire length to catch any material which may drop from the skip car.

The hoisting engine which the Jackson Iron & Steel Company had been using was used in the new construction. It was necessary, however, to provide a new drum and shaft, also a new automatic slowdown and terminal stop device and move the engine to a new location. Part of the old hoist tower was used as a tower for the counterweight for the new skip car. This counterweight consists of a box made of steel plates, filled with pig iron to the proper weight. This arrangement allows the total ore for one round to be carried in one skip car, which materially simplifies the filling of the furnace.

The new furnace top consists of a conical dumping hopper, that simply acts as a chute to guide the material into the receiving hopper, which is 45 in. in diameter and 7 ft. high. As will be noticed, the capacity of the receiving hopper is approximately that of the skip car and being long and narrow makes for good distribution of the stock. The receiving hopper, as well as the dumping hopper, is lined with ½-in. wearing plates. The receiving hopper rests on a cast steel gas seal in four parts, any two of which may be taken out without disturbing the hopper. Hung from the top of the gas seal and making the bottom of the receiving hopper is an orange peel valve in four segments. This is operated by a system of levers from outside the gas seal so as to leave the top surface of the valve absolutely plain. This type of valve has always been successful when used in this way, but has not given satisfaction when operated by chains inside the receiving hopper. The valve is operated by a steam cylinder 10 in. in diameter with a 20-in. stroke at one end of a bell crane. At the other end is connected a curved member which encircles one-half of the receiving hopper, and at the ends of this curved member are cast steel gears which mesh with a similar set of gears on another curved member encircling the other half of the receiving hopper, this latter member being connected to a short bell crane having the same lever arm as the large one. These gears cause each of the bell cranes to move the same distance. The four rods for moving the segmental valve are connected to the curved members at the 45-deg. points and therefore cause the segments of the valve to move exactly the same distance and at the same instant. The valve segments are made of heavy steel castings.



Loading the Scale Car from the Ore Bins. The Car Has a Capacity of 85 Cu. Ft. and Is Designed for One-Man Operation, the Scale Beams and Fingers, Controller, Brake and Operating Levers for Car Doors and Ore Bins Being Conveniently Grouped



Positive Action of the Leaves of the Orange-Peel Bucket Corresponding to the Small Bell is Obtained by the Pairs of Toothed Segments on Opposite Sides of the Hopper Chute, Which Segments Are Attached to the Levers Operating the Leaves

The gas seal rests upon a bell hopper having an inside diameter of 10 ft. At the bottom of this hopper is hung the lip ring against which comes the large bell. This is of ordinary construction. The bell is hung from a round 3-in. bell rod, which is protected the full length by cast steel thimbles. The large bell is operated by a steam cylinder 14 in. in diameter, having a 34-in. stroke. The bell hopper rests on new cast steel brackets which are riveted to the old shell. It was necessary to put an extension of approximately 20 ft. on the bleeder, to carry the top of the bleeder above the top of the new skip bridge. At the top of the skip girders are the sheaves for the ropes which operate the skip car. Around the top of this skip girder is a platform, with railings, to provide for easy oiling of the sheaves. There is a ladder, with safety cage, from the furnace top to this platform. There is provided a derrick on top with which any piece of the furnace top may be handled.

There is provided one mechanical test rod which is connected by a tiller rope to an indicator placed at the stockhouse level near the skip pit. There are also three holes for hand test rods. Indicators are provided at the stockhouse level for showing the position of the orange peel valve and the large bell.

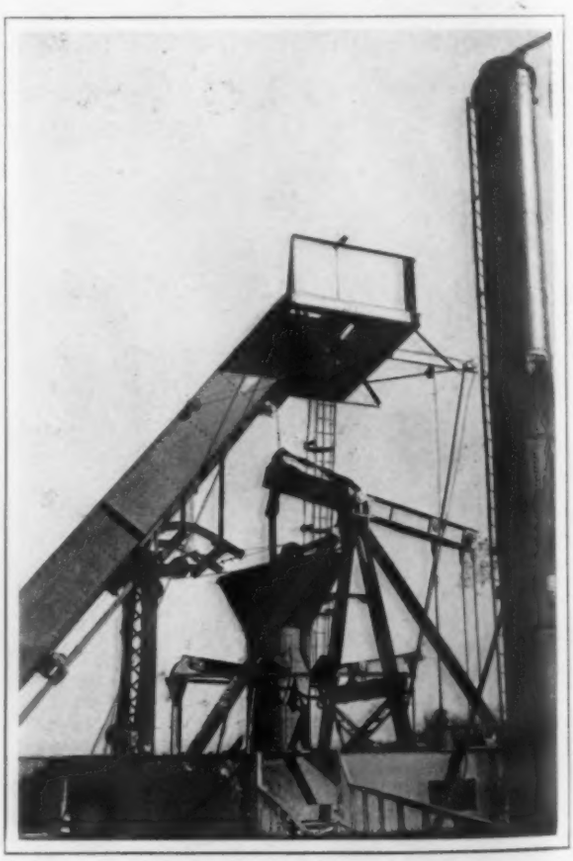
At the side of the skip pit the operating mechanism is placed so that one man may operate the coke bin gate, the mechanical test rod, the hoisting engine and the large bell and the orange peel valve. These are all arranged so that they may be within easy reach of the operator. The coke bin gate is connected by a series of levers so as to throw the operating lever at the side of the skip pit. The hoisting engine is operated by a tiller wheel and tiller rope running from the operator's position to the engine house. The cylinders which move the large bell and orange peel valve are operated by four-way valves, these valves having counterweighted levers to which are connected tiller ropes leading to levers at the operator's position below. These levers have stops at the proper place, and, having counterweights at the furnace top, neither the orange peel valve nor the large bell can be left in the open position without the operator's holding the levers down.

There is also provided one 35-kw., 220-volt Westinghouse turbine-driven generator, together with switchboard and one 15-ton Ohio locomotive crane equipped with a 40-ft. boom and a clam-shell bucket of 1-yd. capacity.

The Jackson Iron & Steel Company blew in January 27, 1915, and is now able to fill its furnace with two men on a turn, one to run the scale car and one to run the skip car, open the bells and tend the coke gate. Before making the improvements 20 men per turn were required in the stockhouse and on top of the furnace. The improvements therefore have saved 18 men per turn and have made possible a larger and more uniform output.

The general contract for all these improvements was let to the Mt. Vernon Bridge Company, which designed and executed all the work. Frank Amsden, who at that time was general superintendent of the Jackson Iron & Steel Company, assisted in the design, and Frank C. Roberts & Co., Philadelphia, checked over and approved the plans for the furnace top and skip bridge. The officers of the Jackson Iron & Steel Company are as follows: Simon Labold, president; D. D. Davis, vice-president; J. F. Morgan, secretary and treasurer.

The American Iron, Steel and Heavy Hardware Association will hold a meeting in San Francisco May 24 to 28, inclusive. N. W. A. Waterhouse, Waterhouse & Lester, Howard street, San Francisco, is president, and John G. Purdie, Marbridge Building, New York City, is secretary-treasurer.



The Upper End of the Skip Bridge and the Conical Dumping Hopper Which Takes the Material from the Skip Car and Delivers It to the Receiving Hopper Below

MACHINE-TOOL CONTRACTS

Confirmed Credits and Payments Against Inland Shipping Documents Desired

There is a growing conviction in the minds of machine-tool builders whose products have been in abnormal demand since the beginning of the war that from this time on they should take greater or at least more general precautions against cancellations of orders which they feel might follow an abrupt termination of the war. This applies more particularly to orders from abroad.

Just prior to the war the amount of work in the shops of machine-tool builders was at low ebb. Some were operating but 20 per cent. of capacity or thereabouts. Then came the eruption in Europe and the manufacture of munitions of war became a world-wide problem, orders from home and abroad made their appearance in increasing volume, men and equipment were speeded up, night shifts were put on and in two months many shops were working at maximum capacity. The pressure was increased gradually, for, as in the case of a steamship, it takes time to get under full headway. Many shops doubled their output, while others increased it by at least two-thirds.

The lathe builders have orders on their books which will tax their capacity to the utmost to the end of August or longer. To carry out their part of the contracts they have entered they have been obliged to place orders for raw materials for months in advance of their requirements and in quantities far in excess of normal. All of these materials must be paid for.

POSSIBILITIES TO BE CONSIDERED

The builders not only have to consider the possibility of cancellations leaving them with excessive quantities of materials on hand and contracted for, but also the danger of their having on their hands large numbers of a few sizes of machines which have been sufficiently modified to remove them from the class of regular standard tools for which there always is more or less demand, such as exists for any staple article. It might require years for the markets of the world to absorb a few thousands of the lathes especially constructed for making shrapnel or explosive shells.

The only certain protection which manufacturers can have, of course, is the adoption of terms of sale that will cover all eventualities. The sentiment is that dealers, both at home and abroad, where the war demand is concerned, should limit large orders to machines actually sold, and that they should so word their contracts of sale that the customers will be obliged to accept deliveries that are made within the time specified. By such procedure the greater burden of the risk would be taken off the manufacturers and distributed in many directions.

TERMS MADE BY OUR MANUFACTURER

In at least one case a manufacturer, without much difficulty, obtained acceptance of a supplementary agreement the terms of which were embodied as follows:

> You (the purchaser) are to establish a confirmed credit in New York to be available for payment of our invoices upon receipt by your forwarders of inland shipping documents and invoices. Each credit is to expire by limitation 30 days beyond the delivery date promised by us at the time the order is booked. Partial shipments allowed; all invoices paid as above are to be subject to 2 per cent. discount.
>
> On our part we are to be subject to a penalty of ½ of 1 per cent. of the value of the order for each week we fail to deliver within the time specified. It is also understood and agreed that if we do not make shipments from ——— of orders within the time agreed upon, it is optional with you and within your power to cancel the order. When business conditions return to normal this supplementary agreement is to cease automatically.
>
> It is also understood and agreed that the original agreement is in no other respect modified.
>
> It is also understood and agreed that this agreement and its fulfillment on our part is subject to strikes, fires or acts of God or the public enemy over which we have no control.
>
> Accepted: Firm's Signature.

AN ALTERNATIVE PROPOSITION

In this instance the machine-tool builder submitted to his customer an alternative arrangement of terms which read as follow:

> Should the establishment of confirmed credit present any special difficulty we offer as an alternative that you pay us one-third cash with the order. Shipments of the remaining two-thirds of the order are to be paid for, sight draft attached to inland shipping documents on arrival of goods at New York. The one-third cash accompanying the order to pay for the last third of the entire shipment, no cancellations permissible if the machines are shipped within the agreed time.

A letter received by a Cincinnati firm arranges for payment as follows:

> Gentlemen: We are in receipt of cable advice from our Helsingfors correspondents, opening confirmed credit in your favor number 6943 on account of Smith & Co. for $58,000 covering the shipment of 140 engine lathes which must be shipped before July 30 from Cincinnati for shipment to Petrograd, via Copenhagen or Bergen. The marine insurance, including war risk, will be effected in Helsingfors. Shipments are to commence the second week in June and are to be continued at the rate of approximately 20 machines weekly until the completion of the order. Payments are to be made upon presentation of invoices and railroad shipping documents. This credit expires by limitation August 30.
>
> Yours very truly,

SCARCITY OF CARGO SPACE A FACTOR

A few weeks ago payment against steamship bill of lading was considered entirely satisfactory, but matters have been complicated by the growing difficulty of obtaining cargo space in the steamers, and one manufacturer is reported to have canceled an order because of his inability to see how space could be obtained within the proper time.

Not all of the manufacturers, by any means, have found it necessary to give special attention at this time to devising terms of sale which will protect them from serious loss in case the war suddenly terminated with a subsequent cancellation of orders. From the beginning of the big movement in machine tools several builders were cautious and amply protected themselves. One, for instance, has obtained prompt payments from a New York bank on the presentation of sight drafts accompanied by railroad bills of lading. A Western company made such advantageous terms for one shipment that the machines and the money for them were both in their possession for a short time. The position of other manufacturers is made safer by the fact that they have refused to alter their designs, and the machines they have sold for war purposes can always be used in standard practice. Of course, other builders were fortunate in the circumstance that their machines needed no alterations.

Anti-Pluvius puttyless skylights and Straight-Push sash operators have been selected and the order placed with the G. Drouve Company, Bridgeport, Conn., for the new group of buildings that will comprise the Massachusetts Institute of Technology on the Charles River road, Cambridge, Mass. About 20,000 sq. ft. of skylights will be required for lighting the class and drafting rooms on the top floors of the eleven buildings that comprise the group. The Straight-Push sash operator is to be used in connection with ventilating sash along the sides of four of the largest skylights.

Philadelphia Scrap Prices, 1896 to 1914

These Prices, Delivered Eastern Pennsylvania, Are Averaged From Weekly Quotations in *The Iron Age.*

Heavy Melting Steel Scrap—Per Gross Ton

	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Jan.	$13.00	$11.75	$10.19	$11.16	$20.00	$14.90	$18.30	$20.00	$11.56	$17.44	$17.33	$18.61	$11.70	$16.94	$17.00	$12.50	$12.19	$14.40	$10.40
Feb.	12.75	11.00	10.25	11.50	21.25	15.62	19.00	20.19	12.56	17.37	16.62	18.69	14.25	15.58	16.62	13.50	11.70	12.87	11.06
Mar.	12.75	10.94	10.25	13.65	21.90	16.00	20.12	20.75	14.00	17.62	15.80	18.87	13.12	13.50	16.50	14.05	11.80	13.25	11.31
April	12.90	10.20	10.19	14.12	21.90	16.75	20.87	20.75	14.69	17.56	16.69	18.75	12.75	13.25	16.12	13.31	12.94	13.44	10.95
May	13.00	10.00	10.25	13.56	18.70	16.55	21.00	20.56	12.50	15.94	16.30	18.95	12.81	14.75	14.75	13.00	13.50	12.10	10.63
June	13.00	9.81	10.35	14.20	16.00	15.75	20.94	20.50	11.35	14.55	15.75	18.75	13.25	15.81	14.45	13.00	13.50	11.75	10.56
July	12.70	10.05	9.75	15.33	11.50	15.81	21.00	19.00	11.12	15.16	15.87	17.62	13.80	15.80	14.12	13.19	13.50	11.35	10.30
Aug.	12.50	10.37	9.81	16.40	10.80	16.70	20.50	17.37	11.75	15.55	16.75	16.85	14.50	16.87	13.75	13.15	13.65	11.43	10.19
Sept.	12.00	10.75	10.45	18.25	12.56	16.44	20.50	15.87	11.90	15.60	17.94	16.50	15.19	17.40	13.85	12.50	14.50	11.62	10.69
Oct.	11.00	10.87	10.44	19.50	12.62	17.50	20.55	13.85	12.87	16.56	18.12	15.35	15.00	18.00	13.81	11.94	15.10	11.15	9.95
Nov.	12.62	10.94	10.25	22.00	14.40	17.19	20.50	11.87	14.75	17.55	18.70	12.94	15.75	18.00	13.50	11.55	15.50	10.19	9.25
Dec.	12.65	10.25	10.35	20.75	16.75	17.81	20.25	11.25	16.20	17.50	19.50	11.50	17.10	17.50	12.65	12.08	15.25	10.00	9.40

Heavy Cast Scrap—Per Gross Ton

Jan.	10.00	9.77	9.25	9.58	17.37	14.50	14.40	19.75	12.75	16.00	16.00	21.70	15.30	15.87	17.00	14.00	13.42	14.50	12.00
Feb.	10.00	9.60	9.25	10.91	17.37	14.00	14.81	19.81	12.81	15.62	15.87	22.00	15.00	15.00	16.12	14.38	13.00	14.37	12.88
Mar.	10.00	9.57	9.25	11.80	17.15	14.60	16.00	20.00	13.30	15.75	15.50	22.25	15.00	14.00	16.00	14.40	13.12	14.00	13.00
April	10.00	9.30	9.25	13.00	16.62	14.00	17.06	20.00	13.37	16.00	15.50	21.25	15.00	14.10	15.87	13.44	13.62	13.94	13.00
May	10.00	9.00	9.25	12.75	15.60	13.95	17.70	19.25	12.50	15.19	15.40	20.80	14.87	14.69	15.06	13.13	13.75	13.60	12.25
June	10.00	9.00	9.20	13.25	14.00	13.52	18.25	18.37	11.60	14.20	15.37	20.75	14.25	15.00	15.00	13.00	13.75	13.25	12.00
July	10.00	9.30	9.00	13.68	13.00	13.62	17.75	17.50	11.25	14.00	15.12	19.25	14.00	14.85	14.94	13.06	13.75	13.00	12.00
Aug.	10.00	9.50	9.00	14.25	13.30	13.75	18.25	15.87	11.50	14.40	16.30	18.60	14.25	15.37	14.25	13.20	13.75	12.87	12.00
Sept.	10.00	9.50	9.20	15.06	14.37	13.75	19.00	14.75	11.50	15.12	17.44	18.00	15.25	15.90	14.00	12.69	13.96	12.81	12.00
Oct.	9.50	9.69	9.25	16.87	13.50	13.75	19.50	13.90	12.37	15.75	18.37	17.60	15.25	16.94	14.00	12.44	14.50	13.50	11.40
Nov.	9.75	9.75	9.25	17.90	13.69	14.00	19.50	12.87	13.75	16.00	19.20	16.50	15.44	17.50	14.00	12.25	14.75	12.62	11.00
Dec.	10.00	9.35	9.25	17.50	14.12	14.00	19.50	12.50	14.90	16.00	21.12	15.50	16.00	17.50	14.00	13.00	15.00	12.17	11.30

Machine Shop Turnings—Per Gross Ton

Jan.	8.00	8.12	7.87	8.58	15.12	9.85	12.95	16.00	8.94	14.50	14.50	16.05	9.00	13.63	14.38	8.12	9.00	11.20	7.30
Feb.	8.25	8.00	7.87	8.83	15.25	10.00	13.50	16.00	9.12	15.75	13.81	16.25	9.87	12.00	13.50	9.19	9.25	10.37	9.00
Mar.	8.50	8.00	8.00	10.25	15.10	10.89	14.44	16.50	9.45	15.19	13.55	16.75	9.62	10.08	12.80	10.00	8.80	10.12	8.75
April	8.30	7.80	8.00	11.00	14.94	12.00	16.37	16.50	10.12	14.75	13.81	16.55	8.40	10.10	11.44	8.81	9.69	10.31	7.90
May	8.00	7.50	8.00	11.37	13.90	12.00	16.20	15.75	9.50	13.50	13.19	16.95	9.12	11.62	9.94	8.25	10.40	9.20	7.50
June	8.00	7.50	8.00	11.75	10.00	11.56	16.00	15.12	8.20	11.00	12.31	16.94	9.50	12.50	9.65	8.40	10.31	8.00	7.69
July	7.80	7.45	8.00	12.50	8.75	11.50	16.50	14.40	7.94	10.66	11.69	15.37	9.80	12.45	9.62	9.00	10.50	7.85	7.75
Aug.	7.56	7.25	7.87	12.50	8.20	11.50	16.12	13.00	8.56	12.90	12.65	14.30	10.75	13.50	8.81	9.30	10.65	8.00	7.91
Sept.	7.75	7.70	8.00	12.75	8.50	11.56	16.00	11.00	8.75	13.62	13.75	14.00	11.50	14.35	8.75	8.19	10.94	8.00	8.56
Oct.	7.75	8.19	8.00	14.00	8.50	11.75	16.00	10.50	9.00	14.25	14.25	12.85	11.80	15.50	8.62	8.00	11.40	7.85	7.90
Nov.	8.06	8.19	8.00	15.55	8.85	12.25	16.00	9.75	9.62	14.40	14.85	10.50	12.94	15.06	8.50	8.00	11.50	7.00	7.50
Dec.	8.25	8.00	8.10	15.50	9.75	12.75	16.00	9.19	12.50	14.50	15.94	9.00	13.90	14.15	8.15	8.91	11.00	7.08	7.65

Cast Borings—Per Gross Ton

Jan.	7.62	7.12	6.87	7.58	13.62	7.94	8.00	10.00	6.50	11.19	11.00	13.55	7.00	12.62	12.22	8.12	8.31	10.85	7.80
Feb.	7.75	6.81	6.75	7.83	13.50	8.00	8.00	10.69	7.00	11.25	10.31	14.50	8.37	11.00	11.50	8.81	8.00	10.37	9.19
Mar.	8.00	6.75	6.94	9.25	13.60	8.00	8.62	11.12	7.35	11.31	9.85	15.37	7.75	8.17	11.20	9.69	8.50	10.06	8.94
April	7.90	6.60	7.00	10.00	13.25	8.37	10.00	11.55	7.56	11.25	10.25	15.69	7.50	8.65	10.38	8.25	9.37	10.25	8.33
May	7.75	6.50	7.00	10.37	11.50	8.75	10.05	11.06	6.75	9.87	9.50	16.00	8.12	9.87	9.84	7.75	9.60	9.17	8.00
June	7.75	6.50	7.00	10.75	8.25	8.00	10.37	10.31	6.35	8.00	9.37	16.12	8.75	10.50	8.80	7.90	9.50	8.25	8.00
July	7.35	6.35	7.00	11.00	7.62	7.81	10.50	9.40	6.12	7.83	9.31	14.37	9.00	10.40	9.50	8.63	9.56	7.85	8.00
Aug.	6.75	6.25	6.87	11.00	6.55	7.25	10.12	8.31	6.50	9.20	10.25	13.50	10.00	11.44	9.31	8.80	9.75	7.94	8.51
Sept.	6.75	6.60	7.00	11.31	6.69	7.31	10.00	7.50	6.75	9.87	11.25	12.81	11.00	12.45	9.25	7.69	10.06	8 18	8.56
Oct.	6.65	7.19	7.00	12.94	6.75	7.50	10.00	7.15	7.11	9.87	11.37	11.20	11.25	13.37	9.06	7.50	10.85	7.90	8.00
Nov.	7.18	7.19	7.00	14.25	7.25	7.87	10.19	6.81	7.75	10.60	12.50	8.37	12.00	13.19	8.50	7.50	11.37	7.50	7.50
Dec.	7.25	7.00	7.10	14.25	7.75	8.00	10.00	6.44	9.80	10.50	13.00	7.00	12.75	12.10	8.15	8.09	10.83	7.17	7.65

No. 1 Railroad Wrought—Per Gross Ton

Jan.	14.00	12.87	12.37	13.16	22.75	18.00	20.00	22.40	15.12	20.75	21.16	22.55	14.30	19.50	19.56	15.63	15.37	16 10	13.05
Feb.	14.38	12.75	12.25	13.50	23.00	18.12	21.00	22.87	15.75	21.50	19.87	21.50	15.94	17.75	18.94	16 06	14.00	15.12	14 38
Mar.	14.00	12.56	12.25	16.00	23.00	19.50	22.50	23.25	17.20	22.37	19.20	21.12	15.31	15.00	19.00	17.20	14.12	15.25	14.00
April	14.00	12.00	12.25	17.50	23.00	19.50	24.37	23.45	17.75	22.50	20.00	20.50	15.00	15.25	18.69	16.06	15.44	15.37	13.25
May	14.00	11.50	12.00	17.75	21.60	19.00	23.60	22.50	15.75	18.75	19.20	20.60	15.00	17.12	17.50	15.25	15.75	15.00	12.63
June	14.00	11.50	12.00	18.60	16.25	18.12	23.37	20.87	13.00	16.00	17.87	20.75	15.25	18.19	16.70	15.00	15.44	14.75	12.50
July	13.20	11.50	12.50	19.50	14.75	17.50	23.00	19.40	12.69	16.16	17.50	19.12	15.95	17.45	16.00	15.13	15.50	13 90	12.25
Aug.	12.75	11 50	12.00	19.80	13.70	18.00	23.00	17.50	13.44	18.80	19.70	18.30	17.50	18.87	15.37	15.70	15.80	14.00	12.07
Sept.	12.50	12.05	12.00	20.87	14.37	17.87	23.75	17.00	14.45	20.50	21.25	18.00	18.25	19.95	16.10	14.75	16.31	14 68	12.38
Oct.	12.70	13.12	12.00	24.37	14.87	18.20	23.70	16.50	15.37	21.62	22.25	17.50	18 30	20.75	16.19	13.94	16.80	14.03	11.81
Nov.	13.00	13.12	12.00	26.00	16.50	19.75	22.50	15.25	17.00	22.70	22.25	15.75	19.19	20.75	16.00	13.85	17.06	13.00	11.51
Dec.	13.00	12.25	12 19	24.50	17.62	20.00	22.00	14.50	19.10	21.87	23.25	14.62	19.95	19.50	15.90	15.00	16.25	12 75	11.51

Old Iron Axles—Per Gross Ton

Jan.	17.00	16.19	15.00	15.16	26.25	20.00	24.20	29.00	15.50	23.12	27.50	31.00	23.00	24.25	28.00	26.00	22.25	26 29	21.00
Feb.	17.50	15.69	15.00	15.50	26.00	20.00	24.50	29.25	18.25	23.25	26.50	31.00	23.00	22.00	27.62	26.00	22.00	27.00	23.00
Mar.	18.00	14.75	15.00	18.00	26.00	21.50	25.50	30.00	20.10	25.25	24.60	31.00	21.00	18.00	27.00	26.00	22.00	27.00	22.25
April	17.60	14.00	15.00	20.75	25.50	22.00	26.25	30.00	21.75	26.00	25.62	30.37	20.00	18.10	28.00	25.00	23.37	26.75	21.00
May	17.00	14.00	15.00	21.00	23.00	21.70	27.40	29.00	18 75	24.50	25.50	30.70	20.00	20.75	26.50	24.25	23.00	26.00	20.00
June	17.50	12.50	15.00	22.20	17.75	21.50	29.00	26.75	16.80	21.80	25.00	31.12	20.00	22.25	26.50	24.00	23.25	25 50	20.00
July	18.00	13.40	15.00	23.00	15.50	21.50	29.00	24.80	17.25	21.33	25.12	29.00	20.80	23.50	26.50	24.25	24.00	25.00	23.00
Aug.	18.00	13.50	15.00	24.60	15.00	22 40	29.50	20.62	17.62	24.00	27.40	28.30	22.25	24.00	26.50	24.50	24.00	25.00	20.00
Sept.	16.50	13.10	15.00	26.25	15.00	22.00	29.25	20.25	18.10	25.00	29.87	27.50	22.50	26.30	26.50	24.00	24.12	25.00	19.75
Oct.	15.60	13.75	15.00	27.75	15.75	23.50	30.00	18.80	19.25	26.12	31.00	27.20	22.50	29.00	26.50	23.50	24.70	25.00	17.80
Nov.	16.50	14.75	15.00	32.00	18.80	23.75	29.25	17.50	20.44	27.30	31.30	24.50	23.25	30.00	26.50	21.30	25.75	22.00	17.50
Dec.	16.60	15.00	15.00	29.00	20.00	24.00	29.00	15.62	23.10	27.12	32.00	23.00	23.95	30.00	26.50	21.50	26.00	21.00	17.50

Old Steel Axles—Per Gross Ton

Jan.	.....	.....	11.00	12.00	12.16	27.25	17.00	19.00	25.00	14.25	20.12	20.62	22.30	18.10	22.50	23.00	19.50	17.25	19.80	15.50
Feb.	.....	.....	11.87	12.00	12.68	27.00	17.00	.....	25.25	16.00	20.25	19.87	21.81	'8.00	20.50	22.62	20.12	17.00	19.00	16 75
Mar.	.....	.....	12.75	12.00	15.15	27.00	17.00	22.00	26.00	17.00	21.25	19.30	22.00	17.62	17.00	22.40	20.80	17.00	19.00	16 25
April	.....	.....	12.40	12.00	16.50	27.00	17.00	24.33	26.00	18.00	22.25	20.12	21.62	17.50	17.05	22.00	20.00	17.00	19.00	15.05
May	.....	.....	12.37	12.00	16.50	24.20	17.00	25.40	26.00	15.50	19.62	19.60	21.80	17.62	18.75	20.62	19.31	17.00	17.70	14.00
June	.....	.....	11.00	12.00	16.60	16.00	17.00	27.00	23.00	15.00	17.30	19.25	21.87	18.00	20.50	20.50	19.25	17.25	17.50	14.00
July	.....	.....	11.60	12.00	17.00	16.00	17.00	27.50	21.80	14.75	17.00	18.75	20.50	18.30	21.30	20.12	19.37	17.50	17.50	14.00
Aug.	.....	.....	11.75	12.00	17.80	17.70	17.00	26.25	19.50	14.62	20.10	20.75	20.20	19.62	21.87	20.00	19.50	17.50	17.50	14.50
Sept.	.....	.....	11.60	12.00	18.75	15.00	17.50	26.00	18.00	15.20	21.00	22.25	20.00	21.25	22.90	20.00	19.00	18.00	18.12	14.81
Oct.	.....	.....	12.00	12.00	27.00	15.40	19.00	25.90	16.40	16.25	21.12	23.87	20.00	21.25	23.62	20.00	18.00	18.70	18.10	13.60
Nov.	.....	.....	12.00	12.00	30.00	17.00	19.00	25.25	14.50	17.87	21.50	23.30	19.62	21.62	24.00	20.00	17.20	19.75	16.44	13.00
Dec.	.....	.....	12.00	12.00	28.00	17.00	19.25	25.00	14.12	18.70	21.50	24.50	18.50	22.20	24.00	19.50	17.25	20.00	15.56	13.00

Old Carwheels—Per Gross Ton

Jan.	12.00	10.25	9.37	10.58	20.50	17.00	16.95	20.30	12.87	16.00	18.75	23.00	18.20	16.00	17.50	13.00	12.37	16.20	12.25
Feb.	12.25	10.25	9.87	11.58	22.00	16.87	17.00	22.62	13.00	16.00	18.75	23.00	16.62	15.50	16.81	13.44	12.00	15.37	12.63
Mar.	12.50	10.00	10.25	14.30	22.00	16.50	17.44	24.50	13.50	16.70	17.70	23.62	15.00	14.00	16.75	14.00	11.94	15.00	12.50
April	12.50	9.55	10.25	15.00	22.75	16.75	17.75	24.20	13.50	17.00	16.75	24.00	14.00	14.05	16.06	13.19	12.87	14.87	12.00
May	12.43	9.12	10.25	15.00	21.20	17.50	19.50	23.62	12.00	16.00	16.75	24.80	14.00	14.25	15.12	13.00	13.90	13.75	11.75
June	12.25	8.81	10.30	15.60	18.00	17.50	19.75	21.87	11.20	14.90	16.69	25.37	13.75	15.00	14.90	13.10	14.00	13.12	11.19
July	11.70	8.85	10.00	16.33	18.00	17.50	20.60	21.30	10.75	14.25	16.19	25.00	13.50	15.05	14.25	12.94	14.00	12.30	11.00
Aug.	11.50	9.25	9.87	17.30	17.00	16.70	20.00	19.12	11.25	15.20	16.75	23.90	14.75	15.62	13.94	13.00	14.05	12.37	11.25
Sept.	11.00	9.25	10.20	19.12	17.50	16.50	20.00	18.25	11.80	15.50	18.37	23.00	15.00	16.80	13.75	12.56	14.25	12.75	11.25
Oct.	10.30	9.87	10.25	21.12	15.75	16.20	19.25	16.40	12.37	16.37	20.94	22.40	15.00	17.50	13.75	11.75	14.87	12 46	10.10
Nov.	10.43	10.00	10.06	23.20	16.50	16.12	20.50	14.43	13.81	17.10	22.00	19.00	15.62	17.50	13.50	11.35	15.00	12.00	9.80
Dec.	10.75	9.25	10.10	21.00	17.00	16.75	20.00	12.75	14.60	18.12	23.00	19.00	16.00	17.50	13.25	12.33	15.50	12.00	10 00

RAIL OUTPUT IN 1914

Only 1,945,095 Tons, With Open-Hearth Production Four Times Bessemer

The American Iron and Steel Institute has just issued from its Philadelphia office Bulletin No. 2 for 1915, giving the statistics of steel rail production in the United States in 1914. The total was 1,945,095 gross tons against 3,502,780 tons in 1913, a falling off of 44 per cent. The 1914 output is the smallest since 1908, the year after the panic, when rail production fell to 1,921,015 tons. And 1908, in turn, made a new low record for 12 years, 1897 alone in that period showing a smaller production at 1,647,892 tons.

PRODUCTION BY PROCESSES

Open-hearth steel rails continue to supplant Bessemer, the former being 78.45 per cent. of the total last year against 72.16 per cent. in 1913. The following table shows the falling off last year from 1913, according to steel processes:

	1914	Per cent.	1913	Per cent.	Decrease	Per cent.
Open-hearth	1,525,851	78.45	2,527,710	72.16	1,001,859	39.64
Bessemer	323,897	16.65	817,591	23.34	493,694	60.38
All other	95,347	4.90	157,479	4.50	62,132	39.45
Total	1,945,095	100.00	3,502,780	100.00	1,557,685	44.47

Girder and high T rails for electric and street railroads are included in the figures above. For recent years the tonnage thus included was as follows: 1911, 205,409; 1912, 174,004; 1913, 195,659; 1914, 136,889 gross tons.

The total production of rails as given above includes, in addition to new rails rolled in the year, rails rerolled from defective rails and from old rails. The total of renewed or rerolled rails so included is given in gross tons in the following table:

	Rerolled from new seconds, new defective rails, etc.				
	Open-hearth	Bessemer	Total	Rolled from old rails	Total rerolled
1911	2,631	19,379	22,010	91,751	113,761
1912	13,140	29,446	42,586	119,390	161,976
1913	13,052	30,741	43,793	155,043	198,836
1914	13,538	13,234	26,772	95,169	121,941

The number of rail mills active in 1914 was 24, of which 10 were rerolling mills. Fourteen plants produced open-hearth rails, nine Bessemer rails and one (Illinois) electric rails. The production of rails by weight according to processes in 1914 is given in the following table in gross tons:

	Under 50 lb.	50 less 85 lb.	85 lb. and over	Total
Open-hearth	96,068	211,414	1,218,369	1,525,851
Bessemer	78,280	97,063	148,554	323,897
Rerolled	64,061	1,358	29,750	95,169
Electric	14	30	134	178
Total	238,423	309,865	1,396,807	1,945,095

PRODUCTION BY PROCESSES 1897-1914

Below is given the record of rail production for the period 1897-1914 by processes. It shows that in 1914 Bessemer rails were only one-tenth of the tonnage rolled only seven years previous:

	Open-hearth	Bessemer	Rerolled*	Electric	Iron	Total
1897	500	1,644,520	.....	....	2,872	1,647,892
1898	1,220	1,976,702	.....	....	3,319	1,981,241
1899	523	2,270,585	.....	....	1,592	2,272,700
1900	1,333	2,383,654	.....	....	695	2,385,682
1901	2,093	2,870,816	.....	....	1,730	2,874,639
1902	6,029	2,935,392	.....	....	6,512	2,947,933
1903	45,054	2,946,756	.....	....	667	2,992,477
1904	145,883	2,137,957	.....	....	871	2,284,711
1905	183,264	3,192,347	.....	....	318	3,375,929
1906	186,413	3,791,459	.....	....	15	3,977,887
1907	252,704	3,380,025	.....	....	925	3,633,654
1908	571,791	1,349,153	.....	....	71	1,921,015
1909	1,256,674	1,767,171	.....	†	....	3,023,845
1910	1,751,359	1,884,442	.....	†	230	3,636,031
1911	1,676,923	1,053,420	91,751	462	234	2,822,790
1912	2,105,144	1,099,926	119,390	3,455	....	3,327,915
1913	2,527,710	817,591	155,043	2,436	....	3,502,780
1914	1,525,851	323,897	95,169	178	....	1,945,095

*Rerolled from old steel rails and renewed rails which the manufacturers could not classify as Bessemer or open hearth. From 1897 to 1910 rerolled rails were included under Bessemer and open-hearth rails.

†Small tonnages rolled in 1909 and 1910 but included with Bessemer and open-hearth rails for these years.

The production of rails in Pennsylvania in 1914 was 592,532 tons against 971,820 tons in 1913.

ALLOY TREATED RAILS

Included in the above figures are alloy treated rails, which are shown separately by processes, for the years 1909-14 below:

	Total production, gross tons	Production by alloys		Production by processes	
		Titanium	Other alloys	Open-hearth and electric	Bessemer
1909	49,395	35,945	13,450	13,696	35,699
1910	257,324	256,759	565	27,389	229,935
1911	153,989	152,990	999	38,539	115,450
1912	149,267	141,773	7,494	40,393	108,874
1913	59,519	47,655	11,864	33,567	25,952
1914	27,937	23,321	4,616	27,447	490

American Foundrymen's Association

A tentative programme has been issued for the annual meeting of the American Foundrymen's Association, to be held at Atlantic City, N. J., in the week of September 27. The by-laws of the association have been revised in accordance with the recent letter ballot, so that after May 1, 1915, the entrance fee will be $10 for active members and $5 for associate members. The changes also provide that "any person who is engaged in foundry work, such as molding foremen, core foremen, pattern foremen, chipping foremen, chemists, etc., or any firm or corporation having a commercial interest in foundry operations though not engaged in the production of castings, or any officer or employee of such firm or corporation," may be elected to associate membership. The Associated Foundry Foremen has given up its charter, and all the members in good standing are now affiliated with the American Foundrymen's Association as associate members. This means that 102 have been added to the membership, increasing the total membership of the association to nearly 1000. The association has also adopted an emblem.

As regards the September meeting, the business and technical sessions will be conducted on Young's steel pier, almost directly opposite the Marlborough-Blenheim Hotel, which is the headquarters. The exhibit of foundry equipment and supplies, under the auspices of the Foundry & Machine Exhibition Company, will open Saturday, September 25, on the steel pier. The programme as outlined so far is as follows:

Tuesday, September 28.—10 a.m., joint meeting between the American Foundrymen's Association and American Institute of Metals. 2 p.m., operating session.

Wednesday, September 29.—10 a.m., joint session between the American Foundrymen's Association and the American Institute of Metals. 2 p.m., gray iron session. 8 p.m., business session, annual address by president, election of officers, etc.

Thursday, September 30.—10 a.m., simultaneous sessions on steel and malleable iron. 2 p.m., simultaneous sessions on steel and malleable iron. 7 p.m., annual banquet.

Friday, October 1.—10 a.m., final business session.

The tin output of the Federated Malay States in 1913, according to the report recently issued, was 50,127 tons, an increase of 1706 tons over that of 1912. The exports of tin and tin ore in 1913 were 50,120 tons against 48,421 tons in 1912. The average 1913 price was equivalent to £195 3s 1.7d ($949.73) per ton, the highest price being £224 12s ($1093.01) on January 2 and the lowest £162 2s 6d ($788.98) on December 24. The total export of tungsten was 206 tons.

The Missouri Geological Survey, Rolla, Mo., has issued an accurate base map of the State. This map is 42 x 50 in., and on a scale of about eight miles to the inch. The railroads are located from original plats, the principal streams are shown in detail, the county outlines are given and the elevations above the sea level are stated. The map can be obtained at 15c. per copy, or 60c. mounted on cloth, by addressing H. A. Buehler, State Geologist.

ESTABLISHED 1855

THE IRON AGE

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Business Men and the Government

The criticism that American business men give little attention to public affairs is fast losing its point. Of late government has had so much to do with business that business men perforce are thinking much of government activities that especially affect them. They are studying hard upon acts of Congress and decisions of commissions. The president of any considerable corporation has come far short of measuring up to his job if he has not acquainted himself with a score of measures, passed or under consideration in Congress since the present administration came into power. That to be sure was not the beginning of such activities by the heads of manufacturing companies. The Interstate Commerce Commission's work alone has forced heavy tasks on manufacturers who would get a grasp of the changing situation as affecting the transportation of their products. The developments in anti-trust legislation have compelled scores of corporation presidents to study closely problems which one day were relegated to the legal departments of such corporations. The manufacturer has had to think hard, too, on the question of trade regulation by commission; on the legislation proposed by labor unions which he has had to combat at Washington, and on the liability laws which legislatures have hurried upon the statute books in State after State. Congressional action has extended even to the regulation of manufacturing methods. Twenty years ago who would have thought of prescribing by act of Congress how those in charge of Government works should manage them with a view to getting the best and the most product at the lowest cost? But to such uses have come labor union politics and the union restriction of output in the name of uplift.

With so many hands is the Government reaching out into businesses that involve factory operation that the employer of 100 men must have a knowledge of law, legislation and government policy that 20 years ago would have been expected only from a member of the legal profession.

Speaking to more than 1700 leading New York business men last week, Elihu Root said that in the past five years more than 62,000 laws had been passed by Congress and State legislatures, most of them having to do with business. That record tells how legislators of all sorts and conditions, bent on putting hobbles on successful industry, have fairly rioted in their schemes of regulation. To the same purport is this statement in the call the Illinois Manufacturers' Association sent out last week for a meeting to protest against further legislative crippling of business:

> Of over 500 bills introduced in the State Senate in the last three weeks almost 50 per cent. deal with regulation of business of manufacturers, merchants and corporations. Business cannot stand another onslaught by lawmakers. Profits have been legislated out of existence and thousands of men out of employment.

The reaction now plainly seen against undue government interference with legitimate business is the sobering up after a long legislative carnival. Now that the President himself has expressed concern, and with the appeal to the people scarcely more than a year ahead, it might well penetrate the minds of even the most aggressive of the radicals that the campaign against prosperity has been carried too far.

The Federal Trade Commission

The new Federal Trade Commission organized a fortnight ago and business men are asking themselves and each other: "What will it do?" It would be well for business men to ask what they themselves will do. It is in their power now more than it will be at any future time to influence, in perfectly legitimate manner, the commission's attitude and policy. The commission is composed of a few individuals, perfectly human beings, whom it would be extravagant to think of as even humanly perfect. Law judges are frequently referred to as being far from perfectly human, their habits and environment having more or less of a tendency to make them otherwise. Similar dangers beset the members of the trade commission. For instruction they have nothing but the law, and it is universally recognized that under the strict letter of the law widely different courses lie open to the commission. The minds of the commissioners are now being formed. Let the most intelligent business man reflect for a moment what he would now do had he been appointed a commissioner. A few things may come to his mind that he would do, but he will recognize that for weeks, months and years information must be sought and judgment must be exercised. The members of the trade commission are likewise human, and as they study their work they will form conclusions from day to day and month to month.

The decisions of law judges in business cases are frequently criticised on the basis that the judges may understand the law but they do not understand business. The opinions of law makers in business law are, not often but usually, criticised because the law makers do not understand business. It is impossible for business men to help the judges because they have no means of coming in contact with them. In the efforts of business men to mold the views of legislators party platforms are a handicap. In the case of the Federal Trade Commission the circumstances are different. The members are few in number and changes in the personnel will be infrequent, while the men who constitute the commission are now, and under favorable conditions will probably continue to be, receptive of the views and information business men may be ready to impart.

It is the clear duty of business men, therefore, to get in touch with the Trade Commission, if they have questions that may have even a remote connection with the commission's work. They have an excellent opportunity to help the commission and help themselves by going to Washington and conferring. In the next few weeks and months the commissioners will be rapidly forming opinions of what American business is and what American business men are. Upon the nature of these opinions will depend largely the course the commission will pursue, for, after all, the law itself, not too explicit even as such laws go, must necessarily leave a wide latitude of choice to the commission. The opinions the commissioners form, in turn, will depend largely upon the character of the business men they meet and upon the manner in which these men conduct themselves. It would be unjust to assume that the commissioners have come to their high office with prejudices, and even were there such prejudices it would be strange if they were not subject to modification through contact with the sober, intelligent and reasonable business men of the country. If such business men neglect the opportunity that now lies before them, they may in considerable measure be responsible should the commission eventually run amuck.

Vicissitudes of the Rail Trade

It is the rule in the iron and steel industry to make new annual records of production, and the exception for any single year to show a smaller production than the preceding year. In the past 50 years the production of pig iron has made new records in 30 of the years, and in the past 20 years it has made new records in 15. Much the same showing has been made in the various finished steel products, some of them indeed making much better records. In the 24 years of its life the tin-plate industry, for instance, has had but seven in which it did not break its previous record.

What, then, shall we say of the rail industry, which in 1914 made less than half as large a tonnage (49 per cent.) as it did in 1906, eight years earlier? But we cannot say that the showing is altogether phenomenal or unprecedented; for looking back—and the steel rail is by far the oldest of the great steel products—it is found that in 1894 the production was only 48 per cent. of that in 1887, seven years earlier. It may be noted incidentally that while the 1914 production was extremely light, it was just a shade heavier than that of 1908, being otherwise the year of lightest production since 1897.

The rail trade is evidently subject to great vicissitudes. The 1887 production, 2,139,640 tons (of which 20,591 tons was iron), stood as the high record until 1899, or 12 years later. It remains to be seen when the later record, 3,977,887 tons, in 1906, will be broken. The average annual production since then has been a shade under 3,000,000 tons, the 1914 production alone being 1,945,095 tons.

Changes in the volume of rail demand are due chiefly to the ups and downs in the laying of new steam railroad track. A comparison of such statistics as are available indicates that ordinary replacements, on account of rails wearing out, vary but slightly from year to year. Since 1907 the ordinary replacements on steam track have ranged from 1,000,000 to 1,500,000 tons a year, averaging close to the lower figure. Some time ago, and particularly in 1905, 1906 and 1907, there was a great deal of special replacement, this being of rails that had not worn out in ordinary service but were failing rapidly because they were of too light section for the heavier duty imposed by the suddenly increased weight of rolling stock. The testimony of railroad engineers is that it is the heaviest locomotives and the greatest speeds that determine the section of rail required, not the average weight or speed.

In 1914 the rails used in the laying of new track amounted to only about 300,000 tons, as the Railway Age Gazette statistics have shown only 2127 miles of first and multiple track laid, while the length of yard and siding track, not reported, was doubtless also very small. In many years in the past the new track laid has exceeded 10,000 miles, the maximum increase being 16,983 miles in 1887, almost three-fourths of this being in single track new main line.

The apparent consumption of rails in the United States in 1913, with production at 3,502,780 tons, imports of 10,408 tons and exports of 460,553 tons, was 3,052,635 tons, while the compilation for 1914 is: Production, 1,945,095 tons; imports, 22,571 tons; exports, 174,680 tons; apparent consumption, 1,792,986 tons. Thus production decreased 44.5 per cent., imports increased 116 per cent., exports decreased 62.1 per cent. and apparent consumption decreased 41.3 per cent.

The decline of the Bessemer rail has been phenomenally rapid, the decadence being facilitated by the fact that capacity for making open-hearth rails was brought into being so rapidly that the railroads have been able in recent years to purchase all of the newer product they desired. In 1906, the year of maximum rail production, the open-hearth output was only 186,413 tons, or 4.7 per cent. of the total. In 1911 open-hearth rails passed Bessemer, while in 1914 there were nearly five tons of open-hearth rails made to one ton of Bessemer, and the small tonnage of Bessemer rails ran disproportionately to light rails, there being more than eight tons of open-hearth to one of Bessemer in the case of rails of 85-pound and heavier section.

Secured Payments for War Orders

On another page is an article dealing with the concern felt by many manufacturers of machine tools over the necessity of properly safeguarding themselves, their stockholders and indirectly the public against the possibility of a wholesale cancellation of orders which might follow a sudden termination of the war. The apprehension which exists is largely due to the fact that orders are still coming out where in each case the number of machines specified is without precedent as to size, while deliveries are to be made several months ahead.

It must be admitted from the manner in which contracts for shrapnel and explosive shells are being placed with some of our largest manufacturing corporations that the end of the war does not seem near at hand, unless, indeed, the allied governments are pursuing a course which involves no chances as to their needs or the duration of the war. At the same time it is well for the makers of those tools which are in such great demand by the makers of munitions of war to surround their transactions with every possible protection. The wisdom of payments against inland shipping documents is accentuated by the difficulty of getting cargo space in transatlantic steamers. With transactions on this basis and payments made through confirmed credits opened in New York banks by the purchaser, the danger of cancellation is obviated. They will, then, have no fear of orders being repudiated or of being left with large stocks of tools which in ordinary times would have but little sale. In addition there would be no apprehension because of the contracts they have entered into for future supplies of raw materials.

It is right that profits so hardly earned should be made secure and that further gains should not be menaced, although danger may be more remote than is feared.

Growth of India's Manganese Ore Exports

India's great expansion in manganese ore production is indicated by the export figures for the fiscal year 1913-1914, showing 718,049 gross tons valued at about $4,045,000 compared with 180,945 tons, valued at about $800,000, for 1904-1905. Exports in recent fiscal years are indicated by the following table:

Year	Tons	Value
1909-10	500,000	$2,635,000
1910-11	573,000	3,065,000
1911-12	536,000	2,885,000
1912-13	708,000	3,815,000
1913-14	718,000	4,045,000

In four years the increased development is nearly 50 per cent. The average declared export values per ton in the last three years are as follows: 1911-12, $5.22; 1912-13, $5.23; 1913-14, $5.47.

Manganese Ore Instead of Ferromanganese

The use of ground manganese ore instead of ferromanganese in making semi-steel is reported at the gray iron foundry of the Burr Company, Champaign, Ill. It is said to be used in comparatively small pieces with the same effect on the semi-steel. The pieces used average 1 in. in diameter and analyze about 6.50 per cent. silica, 5.45 per cent. iron, 51.45 per cent. manganese and 0.09 per cent. phosphorus.

The William Graver Tank Works, East Chicago, Ind., will remove its Chicago office from 209 South LaSalle street, to the Webster Building, LaSalle and Van Buren streets.

CORRESPONDENCE

Beer Drinking and the Workingman's Efficiency

To the Editor: To a beer-lover with a workingman's appetite—and everybody with a workingman's appetite is a beer-lover if he has given it a fair trial—the stubborn and persistent mistake of the overfed and underexercised office man in supposing that lager beer is an alcoholic stimulant and that it is taken as such, is in the last degree exasperating. True, it contains two per cent. alcohol which it would be far better without if it could be made of the same taste without it, but since this two per cent. is not felt until many glasses after the point has been reached where the beer ceases to be palatable—except with a smoke-talk thirst on hand—it may be forgiven though deplored, and has certainly nothing whatever to do with the worker's efficiency, while the beer itself is an encouragement of efficiency, just as a segment of a fat pumpkin pie is such. True again, both these forms of nourishment are costly for the amount of nourishment contained in them, but not therefore a waste, as your correspondent, Mr. Hackett, says in his communication published January 28. Man cannot live by bread alone, except at a pinch and under certain national administrations, but must have beer, pumpkin pie and other things that are stronger in satisfaction given than in actual nourishment.

FROM THE STANDPOINT OF TEMPERANCE

And this is what makes lager beer the workingman's greatest blessing in the food and drink line, that nothing in the world—absolutely nothing—tastes so good to him when he is hungry and thirsty as it. Also it is unique in this respect that after he has gulped two or three glasses, the first one ravenously, nothing in the world is so untempting and unpalatable. Like nectar when hungry and thirsty, like medicine after two or three glasses. So instead of being the deadly alcoholic scourge that Mr. Hackett's imagination fervidly pictures it, it is on the contrary the ideal temperance food and drink. It is unique also in another respect, that although expensive in itself from the standpoint of simple nutrition, as Mr. Hackett points out, yet it adds zest and enjoyment to cheap foods of high nutriment but low palatableness. It makes bread and onions a meal plenty good enough for anybody—anybody with an appetite, that is—and the workingman who does not have his beer at home sincerely wonders why his baker cannot supply him with bread as good as he gets at the saloon and why his wife cannot make cold-slaw up to the saloon's high standard of quality.

In brief, lager beer is to the workingman a good thing on the whole, and the employer's interest lies in helping him to it. Whiskey the employer must keep out of the works, as he would keep out a wild animal or a mad dog, and total abstinence should be a condition attaching to employment, not merely on account of safety, but also because a worker who drinks whiskey, however moderately, is obviously a helpless ass from whom nothing in the way of efficiency is to be expected. But far more important to the employer—and to the office man in general—than stamping out the workingman's beer habit is to acquire it himself, as he would if he had the workingman's appetite. For such an appetite would mean to him a deliverance from the danger he now runs of dying at fifty with "Bright's disease and a complication of ailments" brought on by habitual overfeeding. Let him wait always for the worker's appetite, eating nothing but fruit each meal that finds him without that appetite—but a good square meal of anything he likes (and he will like beer above everything) and as much as he likes, when he has the worker's appetite. And as helps to the acquirement of it let him practice open-air sleeping, calisthenics and a cold bath in the morning and a run and walk at the noon-hour.

GEORGE AUCHY.

Tacony, Philadelphia.

BETHLEHEM STEEL REPORT

Largest Net Earnings in the History of the Bethlehem Steel Corporation

The report of the Bethlehem Steel Corporation, covering the operations of all subsidiaries in the year ended December 31, 1914, presents a brilliant contrast to the sorry showing made by other steel companies for that eventful period. The net earnings considerably exceeded those of any previous year. The surplus for the year, after deducting 7 per cent. on the preferred stock, was equal to 30.59 per cent. on the common stock, against 27.44 per cent. the previous year. The income account compares as follows:

	1914	1913
Net manufacturing profit, after deducting expenditures for repairs and maintenance ($2,869,000 in 1914)	$9,378,385	$8,530,708
Other income	271,282	221,963
Total income	$9,649,668	$8,752,671
Interest on notes and advances	170,999	137,164
Interest on funded debt	2,041,375	1,964,020
Depreciation	1,500,000	1,272,270
Fund for extinguishment of mining investments, patents, etc.	347,273	256,516
Surplus	$5,590,020	$5,122,703
Preferred dividend	745,400	745,400
Balance	$4,844,620	$4,377,303
Discount on securities	.....	3,180,740
Appropriation for additions and working capital	5,000,000	.....
Previous surplus	2,214,517	1,017,954
Profit and loss surplus	$2,059,137	$2,214,517

The balance sheet as of December 31, 1914, compares as follows:

Assets

	1914	1913
Property account	$80,480,919	$72,891,695
Funds with trustees	34,478	34,461
Inventories	11,130,734	10,206,734
Notes and accounts received	8,448,851	9,909,956
Contingent and depreciation fund	403,839	.....
Miscellaneous investments	437,664	365,372
Cash	5,220,910	1,963,281
Deferred charges	220,369	227,800
Total	$106,377,767	$95,599,300

Liabilities

Preferred stock	$14,908,000	$14,908,000
Common stock	14,862,000	14,862,000
Funded debt	36,207,700	33,599,033
Notes and accounts payable	12,664,619	9,642,813
Bond interest	487,814	483,807
Reserve for depreciation, etc.	10,721,074	9,586,010
Reserve for relining furnace, etc.	1,967,421	2,803,119
Appropriations from surplus	12,500,000	7,500,000
Surplus	2,059,137	2,214,517
Total	$106,377,767	$95,599,300

Orders on hand at the end of each year since 1905 compare as follows:

1905	$14,466,307	1910	$17,370,660
1906	13,300,885	1911	15,885,198
1907	8,425,736	1912	29,282,182
1908	7,592,502	1913	24,865,560
1909	14,073,834	1914	46,513,189

President Charles M. Schwab, in his accompanying remarks, says:

"Notwithstanding the generally depressed state of trade throughout the year in commercial lines, the variety of the products of the corporation, which has directly resulted from its policy of extensive development in diversified lines of manufacture, enables it to report the best record in its history, the total net earnings of the corporation and its subsidiary companies for 1914 being $9,649,667, as against $8,752,671 for the year 1913. In view of these earnings a dividend was declared on the preferred stock of the full 7 per cent., payable in quarterly instalments during 1915.

"On June 11, 1914, the Bethlehem Steel Company issued $3,000,000 of its one-year 5 per cent. secured gold notes, guaranteed principal and interest by the corporation, and secured by a pledge of $4,300,000 first lien and refunding mortgage 5 per cent. 30-year gold bonds, of which notes $1,410,000 face value have, since the close of 1914, been canceled or called for redemption.

"The various plants of the corporation have been maintained throughout the year at a high standard of physical condition, and the effect on the cost of operations of the economies which have been introduced has been entirely satisfactory."

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American Steel Foundries to Make Electric Steel

The American Steel Foundries will add electric steel castings to the products of its plant at Indiana Harbor, Ind. It has been given a license by the United States Steel Corporation for the construction of a 6-ton Heroult electric furnace. This makes a total of 19 Heroult furnaces operating or building in this country, the one in Canada making 20.

The successful starting in operation of the 1-ton Heroult furnace last week at the Lebanon Steel Foundry, Lebanon, Pa., is announced. A feature of this furnace is that it tilts with the fulcrum close to the spout, instead of the usual roller or rack and pinion arrangement, thus causing the pouring point of the spout to pass through a much smaller arc and making possible a thorough emptying of the furnace.

The Erie Iron & Metal Company, Erie, Pa., has removed its offices to larger quarters at 812-13 Commerce Building. It will retain its warehouses at Thirteenth and Chestnut streets, where a complete stock will be carried of new and second-hand bar iron and steel shapes and plates for general construction work. The company will also continue its business in iron and steel scrap. It has recently been incorporated under Pennsylvania laws and the officers are as follows: B. Emerman, president; I. H. Emerman, treasurer; L. A. Weil, secretary.

The Iron and Metal Markets

EXPORT ORDERS GROWING

French Contract for 100,000 Tons of Bars

Domestic Buying in Heavy Lines Light in View of Price Advances

Orders placed in the past two weeks with steel works in this country by European governments have exceeded those in any fortnight since the war began. An important French steel interest has just placed 100,000 tons of bars with a Lake steel works through a Central Western dealer and specifications for 45,000 metric tons of 2-in. and 3-in. rounds applying on this order are already in hand. Negotiations are pending for 30,000 tons additional. Deliveries are to be made at the rate of 25,000 tons a month.

That this country must furnish large amounts of steel first and last to France and England is daily more evident and the urgency of the need will relieve shipments on these contracts from the uncertainties of ordinary ocean transport, the governments themselves providing vessels in some cases.

Export business both with belligerent and neutral countries is larger than is generally appreciated. As a partial offset to the low railroad demand, its effect on the effort to establish higher prices in the domestic market is a factor to which consumers are giving more attention.

Naturally specifications on 1.10c. and 1.15c. contracts for plates, shapes and bars have gone in in good volume in the past week, in view of the advance by important producers to a 1.20c. Pittsburgh basis for the second quarter. The effect of this advance, as with the change to the 1.15c. basis on March 1, is to cause buyers to hold off while the supply-and-demand test is made. At such a time jobbers' stocks bought at 1.05c. and 1.10c. may become active.

The efforts of the steel companies to carry out the step process of advances in plates, shapes and bars have held many consumers down to short deliveries, but shipments on old contracts will extend through April and May in some cases, and in agricultural bars through June. Already third quarter business is being considered here and there, mostly in bars, and the Steel Corporation has indicated that for that delivery it will ask 1.25c. for bars as well as plates and structural shapes.

In domestic business new buying in most lines has been less than shipments, production of finished material in March being the largest in months, and an excess of shipments over orders is indicated for the immediate future.

The call for steel bars for agricultural machinery has been better month by month. In iron bars mills have had difficulty accumulating specifications for a week's run at a time.

Recent buying of rails by the Erie amounts to 21,000 tons, all placed at Pittsburgh. Scarcely 1200 cars are up for bids. Locomotives bought for export since the war started are about 250.

There are still prophecies of improvement in structural demand, but current contracts are only a fraction of capacity. A recent letting in the East was at $32.50 for the steel erected.

The volume of line pipe work is again considerable. Recent contracts include 30 miles of 8-in. pipe for a line to Independence, Kansas; 23 miles of 8-in. pipe for the Dominion Natural Gas Company, one-third being placed in Canada and two-thirds at Pittsburgh; 20 miles of 6-in. pipe for Oklahoma and 90 miles of 6-in. pipe taken in the Wheeling district for a Western oil line.

A number of automobile builders have taken out all the special sheets covered by their early contracts and are placing new orders. Nearly 70 per cent. of hot sheet mill capacity has been active lately.

Steel companies at Pittsburgh and Youngstown have made round sales of semi-finished steel, largely sheet bars, but also a good percentage of forging billets, car repair work being particularly active.

The whirlwind in Buffalo pig iron has passed. From 350,000 to 400,000 tons was swept up in about 10 days. Some sellers there have advanced prices to $12.50 for No. 2X, second quarter, and $13 for second half. In other districts the Buffalo cuts have led consumers to expect concessions which have not yet been offered, and therefore buying waits. More than 400 foundry buyers participated in the Buffalo movement. Throughout the trade the bearing of these low-priced sales on the outlook for the remainder of the year is discussed, with perhaps too little emphasis on the alacrity with which buyers responded.

Considerable Southern pig iron was moved in March, with some reduction in stocks. Large export shipments of Alabama iron are scheduled. Thus far vessels have not been available.

Breaking the long embargo, a shipment of 5000 tons of British ferromanganese to this country is promised in a cablegram received this week.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month, and one year previous.

	Mar. 31, 1915.	Mar. 24, 1915.	Feb. 24, 1915.	Mar. 25, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia....	$14.25	$14.25	$14.25	$15.00
No. 2, Valley furnace....	*12.75*	13.00	13.00	13.25
No. 2 Southern, Cin'ti...	12.15	12.15	12.40	14.00
No. 2, Birmingham, Ala..	9.25	9.25	9.50	10.75
No. 2, furnace, Chicago*	13.00	13.00	13.00	14.25
Basic, del'd, eastern Pa.	13.50	13.50	13.50	14.25
Basic, Valley furnace....	12.50	12.50	12.50	13.00
Bessemer, Pittsburgh....	14.55	14.55	14.55	14.90
Malleable Bess., Ch'go*..	13.00	13.00	13.00	14.25
Gray forge, Pittsburgh...	13.45	13.45	13.45	13.65
L. S. charcoal, Chicago..	15.75	15.75	15.75	15.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh.	20.00	20.00	19.50	21.00
O.-h. billets, Pittsburgh.	20.00	20.00	19.50	21.00
O.-h. sheet bars, P'gh...	21.00	21.00	20.50	22.00
Forging billets, base, P'gh	25.00	25.00	24.00	25.00
O.-h. billets, Phila.....	21.52	21.52	21.52	23.40
Wire rods, Pittsburgh...	25.00	25.00	25.00	26.50
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	12.00	12.00	11.75	12.75
Iron rails, Philadelphia..	13.00	13.00	13.00	16.50
Carwheels, Chicago.....	9.75	9.75	10.00	11.75
Carwheels, Philadelphia..	11.00	11.00	11.00	12.25
Heavy steel scrap, P'gh.	12.00	12.00	11.75	12.00
Heavy steel scrap, Phila.	11.00	11.00	10.00	11.00
Heavy steel scrap, Ch'go	9.25	9.25	9.75	9.75
No. 1 cast, Pittsburgh...	12.00	12.00	11.25	11.50
No. 1 cast, Philadelphia.	12.00	12.00	12.00	13.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	10.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel, Per Lb. to Large Buyers:	Mar. 31, 1915. Cents.	Mar. 24, 1915. Cents.	Feb. 24, 1915. Cents.	Mar. 25, 1914. Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.15	1.15	1.20	1.22½
Iron bars, Pittsburgh	1.10	1.10	1.10	1.35
Iron bars, Chicago	1.12½	1.12½	1.10	1.15
Steel bars, Pittsburgh	1.15	1.15	1.10	1.20
Steel bars, New York	1.319	1.319	1.269	1.36
Tank plates, Pittsburgh	1.10	1.10	1.10	1.15
Tank plates, New York	1.269	1.269	1.269	1.31
Beams, etc., Pittsburgh	1.15	1.15	1.10	1.15
Beams, etc., New York	1.269	1.269	1.269	1.31
Skelp, grooved steel, P'gh	1.12½	1.10	1.10	1.20
Skelp, sheared steel, P'gh	1.17½	1.15	1.15	1.25
Steel hoops, Pittsburgh	1.25	1.25	1.25	1.25
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	1.80	1.80	1.80	1.95
Galv. sheets, No. 28, P'gh	3.40	3.40	3.40	2.95
Wire nails, Pittsburgh	1.60	1.60	1.60	1.60
Cut nails, Pittsburgh	1.55	1.55	1.55	1.65
Fence wire, base, P'gh	1.40	1.40	1.40	1.40
Barb wire, galv., P'gh	2.10	2.10	2.00	2.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$1.50	$1.50	$1.50	$1.85
Furnace coke, future	1.65	1.65	1.65	2.00
Foundry coke, prompt	2.00	2.00	2.00	2.40
Foundry coke, future	2.15	2.15	2.15	2.65
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	17.00	16.00	15.25	14.87½
Electrolytic copper, N. Y.	15.62½	15.37½	14.62½	14.50
Spelter, St. Louis	9.25	9.35	9.35	5.12½
Spelter, New York	9.50	9.50	9.50	5.27½
Lead, St. Louis	4.12½	4.05	3.77½	3.87½
Lead, New York	4.15	4.10	3.85	4.00
Tin, New York	52.00	50.50	38.60	38.50
Antimony, Hallett's, N. Y.	29.00	27.00	19.00	6.75
Tin plate, 100-lb. box, P'gh.	$3.35	$3.35	$3.10	$3.30

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal has no stability, being dependent on vessel charges.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c. to 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plate. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.15c. to 1.20c.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $1.90. Galvanized barb wire and staples, $2.10; painted, $1.60. Wire nails to jobbers, $1.60. Galvanized nails, 1 in. and longer, $1.20 advance over base price; shorter than 1 in., $1.70 advance over base price. Woven wire fencing, 72 per cent. off list for carloads; 71 off for 1000-rod lots; 70 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized	2.00	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wire Rods.—Bessemer, open-hearth and chain rods, $25.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 11, 1915, and iron pipe from February 12, 1915, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	65½	⅜	65	44
⅝ to 3	80	69½	½	69	54
			¾ to 2½	72	59

Lap Weld

2	77	66½	1¼	56	43
2½ to 6	79	68½	1½	67	54
7 to 12	77	66½	2	68	56
13 and 14	63½	..	2½ to 4	70	59
15	61	..	4½ to 6	70	59
			7 to 12	68	58

Reamed and Drifted

1 to 3, butt	78	67½	1 to 1½, butt	70	57
2, lap	75	64½	2, butt	70	57
2½ to 6, lap	77	66½	1¼, lap	54	41
			1½, lap	65	52
			2, lap	66	54
			2½ to 4, lap	68	57

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	68	55½	⅜	63	50
½	73	64½	½	67	58
⅝ to 1½	77	68½	¾ to 1½	71	60
2 to 3	78	69½	2 and 2½	72	61

Lap Weld, extra strong, plain ends

2	74	63½	1½	65	55
2½ to 4	76	65½	2	66	57
4½ to 6	75	64½	2½ to 4	70	59
7 to 8	69	58½	4½ to 6	69	58
9 to 12	64	53½	7 to 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

¼	63	54½	¾	57	47
½ to 1½	66	57½	½ to 1½	60	50
2 to 2½	68	59½	2 and 2½	62	52

Lap Weld, double extra strong, plain ends

2	64	55½	2	58	47
2½ to 4	66	57½	2½ to 4	60	52
4½ to 6	65	56½	4½ to 6	59	51
7 to 8	59	48½	7 to 8	52	42

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.	49
2½ and 2¾ in.	65	2¼ in.	45
3 and 3¼ in.	70	2½ and 2¾ in.	54
3½ and 4½ in.	72	3 and 3¼ in.	57
5 and 6 in.	65	3½ and 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River, must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points. On standard charcoal iron tubes for desirable orders the above discounts are shaded an extra 5, and occasionally two 5's by some makers.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30

days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.25 to 1.30
Nos. 9 to 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.45 to 1.50
No. 12	1.45 to 1.50
Nos. 13 and 14	1.50 to 1.55
Nos. 15 and 16	1.55 to 1.60
Nos. 17 to 21	1.60 to 1.65
Nos. 22 and 24	1.65 to 1.70
Nos. 25 and 26	1.70 to 1.75
No. 27	1.75 to 1.80
No. 28	1.80 to 1.85
No. 29	1.85 to 1.90
No. 30	1.95 to 2.00

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	2.40
No. 12	2.50
Nos. 13 and 14	2.50
Nos. 15 and 16	2.65
Nos. 17 to 21	2.80
Nos. 22 and 24	2.95
Nos. 25 and 26	3.10
No. 27	3.25
No. 28	3.40
No. 29	3.55
No. 30	3.70

Pittsburgh

PITTSBURGH, PA., March 30, 1915.

Definite inquiries are in this market for $20,000,000 worth of 3-in. shrapnel shells for the French Government, which has agreed to deposit $5,000,000 in cash against the order, the other payments to be made as fast as the material is landed on dock at New York for shipment. Last week the Carnegie Steel Company took orders for over 50,000 tons of finished and 100,000 tons of semi-finished steel; its shipments of finished steel were slightly over 50,000 tons. The amount of foreign business in steel products being placed in this country is amazing. Week before last the Steel Corporation booked 74,000 tons for export, comprising 33,000 tons of shapes, plates and bars, 29,000 tons wire products, 7000 tons sheet and tin mill products, and the remainder miscellaneous material. Much of the foreign business booked by the Steel Corporation is being rolled in Pittsburgh mills, mostly by the Carnegie Steel Company, and explains to some extent the heavy increase in operations of that interest. Last week the Steel Corporation operated to 70 per cent. of ingot capacity, the heaviest rate reached in some months. Domestic demand is keeping up fairly well, and specifications against contracts in March were heavy. The average of prices on material shipped out in March was slightly higher than in February, and it is believed average prices in April will show an increase over March. Specifications against contracts for plates, shapes and bars taken some time ago at 1.15c. are now coming in, while most of the business in March was at 1.10c. or lower. The pig-iron trade is quiet. Prices on billets and sheet bars are firm, and there is more movement in coke than for some time. The scrap trade is dormant.

Pig Iron.—The heavy buying movement in pig iron in the Buffalo district last week has not reached Pittsburgh, as new inquiry is light. It is believed, however, that some of the larger consumers of foundry iron in this district will soon send out inquiries for their needs for the second half of this year. No. 2 iron at $11.50 in Buffalo, can be laid down in Pittsburgh at $13.34, and this figures out $12.39 at Valley furnace. It is not believed that any Valley makers of foundry iron would name such a low price, but $12.75, Valley, can be done for No. 2, and possibly a little less. Shipments of basic iron by the Shenango Furnace Company to Italy are now said to be 2000 tons. There is no local inquiry for basic or Bessemer; in fact, not enough pig iron is being sold in this market to fix values. Nominal prices are about as follows: Bessemer iron, $13.60; basic, $12.50; malleable Bessemer, $12.75; No. 2 foundry, $12.75 to $13; and gray forge, $12.50, all at Valley furnace, with a freight rate of 95c. a ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—Up to Monday, March 29, orders sent to the mills for rolling by the billet and rail sales bureau of the Carnegie Steel Company showed an increase of 34,000 tons over the same period in February, and the increase for the whole month is expected to exceed 40,000 tons. Prices on billets and sheet bars are strong, and specifications are active. We note sales of 10,000 to 12,000 tons of Bessemer and open-hearth billets at prices that figure out about $20, delivered to Pittsburgh mills. We quote Bessemer and open-hearth billets at $19, and Bessemer and open-hearth sheet bars, $19.50, f.o.b. maker's mills, Youngstown; Bessemer and open-hearth billets, $20, and Bessemer and open-hearth sheet bars, $21, f.o.b. Pittsburgh. Forging billets are quoted at $25 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. Axle billets are quoted at $21 to $22.

Ferroalloys.—One cargo of 500 tons of 80 per cent. ferromanganese has come into this country from England, but it has not changed the situation, except that prices asked for prompt shipment are a little lower. Sales of domestic 80 per cent. ferromanganese have been made at slightly under $100, Pittsburgh, and the market for prompt delivery ranges from $95 to $100. There is very little new inquiry, as consumers are covered for some time. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71; delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $17; 11 per cent., $18, and 12 per cent., $19, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads, 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Structural Material.—The Cambria Steel Company will furnish 700 tons of plain material to be fabricated by the Decatur Bridge Company for the Wabash Railroad. An inquiry is in the market for 350 tons of shapes for a sugar mill at Payson, Utah. On April 1 the Carnegie Steel Company and Jones & Laughlin Steel Company advance prices on plain material to 1.20c. for second quarter. It is stated that consumers are covered for some little time on specific work in the market at 1.15c. or less. We quote beams and channels up to 15-in. at 1.20c., Pittsburgh, for April, May and June delivery.

Plates.—Specifications against contracts for plates taken some time ago at 1.10c. and less for first quarter were very active in the last week in March, and deliveries on some of these contracts will no doubt extend through April and possibly May. The two leading makers advance prices April 1 on ¼-in. and heavier plates to 1.20c. for second quarter delivery. The only new inquiry for steel cars reported is one from the Minneapolis & St. Louis Railroad for 900 box cars and 100 coal cars. Local plate mills are operating from 65 to 90 per cent. of capacity. We quote ¼-in. and heavier plates from April 1 for second quarter delivery at 1.20c., Pittsburgh, but this price has not been tried out.

Steel Rails.—New orders for standard sections are dull, but the demand for light rails, especially from traction companies, is active. Prices on light rails continue low, due to competition from the rerolling mills. The Carnegie Steel Company is now rolling at its Edgar Thomson works about 9000 tons of 90-lb. rails for shipment to Greece, and has sold 457 tons of steel ties to the Cleveland Railways Company. This company has more business booked in rails than at any time for five or six years, quite a good deal of it being for export. We quote standard section rails made of Bessemer stock at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10 lb. section, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. The prices of light rails are materially shaded on large lots, and the rerolling mills are underselling makers of rails rolled from billets from 50c. to $1 per ton.

Sheets.—Orders for hot sheet and tin mill products received in March, and sent to the mills for rolling, by the American Sheet & Tin Plate Company were the heaviest in any one month for two years, and shipments in March were also the heaviest for the same period, except in one month last year. The automobile builders are specifying freely for high grade sheets, and other consumers are taking good quantities of black and galvanized and blue annealed sheets. Export business is good. Some small orders are being placed for light gauges of galvanized sheets at 3.40c., for prompt shipment, but on 22 and heavier 3.25c. would be done. This week the American Sheet & Tin Plate Company is operating to about 69 per cent, of its sheet mill capacity, and the independent mills are running at a heavier rate than for some time. A Youngstown interest was operating its sheet mills to 100 per cent. of capacity last week. It is too early yet to judge whether the average reduction of 11.2 per cent. in the sheet mill scale will have any effect on prices. We quote No. 28 Bessemer black sheets at 1.80c. to 1.85c., No. 28 galvanized at 3.40c., Nos. 9 and 10 blue annealed sheets 1.30c. to 1.35c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Tin Plate.—A feature of the market is the continued heavy export demand. In addition to foreign orders recently noted, the American Sheet & Tin Plate Company has taken about 75,000 boxes for shipment to the Far East and 8200 boxes for Buenos Ayres, for which excellent prices were obtained. The domestic demand for tin plate is only for small lots for prompt shipment. The American Sheet & Tin Plate Company continues to operate at about 95 per cent. of its tin mill capacity, and independent mills from 90 to 100 per cent. On the small inquiries coming in the mills quote about $3.35 for 14 x 20 coke plates, but a good order would shade this price.

Wire Rods.—Foreign inquiry is again quiet, and there is very little domestic demand, as consumers are covered up to June 30 on contracts placed some time ago at prices ranging from $24 to $25 at mill. Specifications are fairly active. We quote Bessemer, open-hearth and chain rods at $25 to $26, f.o.b. Pittsburgh, the latter price having been paid for small lots.

Steel Car Wheels.—New orders are light and the outlook for new business is discouraging. We quote standard 33-in. freight carwheels, 6¼-in. rough bore, at $15, and standard 36-in. passenger, the same bore, at $21 per wheel, f.o.b. Pittsburgh.

Shafting.—Specifications from the large users, such as the automobile and implement makers, are coming in at only a moderate rate. The new demand is not heavy. The discounts on shafting recently adopted will not cut much figure until about July 1, as most consumers are covered up to that date on contracts placed some time ago under the old discounts. We quote cold-rolled shafting at 70 per cent. off in carloads and larger lots, and 65 per cent. on small lots, f.o.b. Pittsburgh, freight to destination added.

Railroad Spikes.—Only small orders are being placed, as nearly all the railroads have covered their needs for this year. Makers report specifications now coming in. The New York, New Haven & Hartford Railroad has an inquiry out for about 200,000 tie plates, its requirements for this year. We quote standard railroad spikes at $1.35 to $1.40, and small spikes at $1.45 to $1.50 in carload and larger lots, f.o.b. Pittsburgh.

Hoops and Bands.—Effective Thursday, April 1, prices on steel bands will advance to 1.20c. for second quarter, but the larger consumers covered their needs some time ago on contracts at slightly lower prices, so that the amount of buying in April will likely not be large. Mills are booking orders up to March 31 at 1.15c. for shipment at their convenience. We quote steel bands at 1.20c., on new orders from April 1, and steel hoops at 1.25c. to 1.30c. at mill.

Skelp.—The local market is showing more activity than for a long time. Sales of 15,000 to 20,000 tons of grooved steel skelp have been made by local mills for forward delivery. There is also some foreign inquiry. The skelp mills are now busier than at any time for months. Prices are slightly higher. We quote: Grooved steel skelp, 1.12½c. to 1.15c.; sheared steel skelp, 1.17½c. to 1.20c.; grooved iron skelp, 1.50c. to 1.55c.; sheared iron skelp, 1.60c. to 1.65c., delivered to consumers' mills in the Pittsburgh district.

Wire Products.—Foreign demand for barb wire continues heavy, the American Steel & Wire Company booking in one week recently about 29,000 tons. Other makers also report continuous booking of foreign orders. Domestic buying is light, but specifications against contracts are fairly active. Shipments of wire products in March by the leading mills were heavier than in any one month for a long time, but business will probably show a falling off in April. The new price of $2.20 on galvanized barb wire named by one leading maker has not been followed by others. Mills quote as follows: Wire nails, $1.60; galvanized nails 1 in. and shorter taking an advance of $1.70 over this price, or $3.30, and galvanized nails, 1 in. and longer, an advance of $1.20, or $2.80; plain annealed wire, $1.40; galvanized barb wire and fence staples, $2.10 to $2.20; painted barb wire, $1.60, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. for cash in 10 days. We quote woven wire fencing at 72 per cent. off in carload lots, 71 per cent. off on 1000-rod lots and 70 per cent. on small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Two leading makers of steel bars report new orders more active. Shipments in March were heavier than in any one month for a long time. Some of the larger consumers of steel bars are covered through second quarter at 1.15c., and the mills accepted orders up to March 31 at 1.15c. for shipment at their convenience, so that quite a good deal of business at this price will not be shipped out before April or May. Mills, therefore, expect that the new price of 1.20c., which went into effect April 1, will probably cause a falling off in the demand. Business in steel reinforcing bars and common iron bars is more active. Effective from April 1 the Carnegie, Republic and Jones & Laughlin companies are quoting 1.20c. on steel bars for second quarter delivery. Common iron bars, made from part scrap, are still quoted at 1.10c. to 1.15c., f.o.b. Pittsburgh.

Merchant Steel.—A leading mill reports its new orders and shipments in March to have been the heaviest in any one month for over a year. Specifications against contracts for seasonable steels are coming in more freely. Prices are firm but no higher, and on small lots are as follows: Iron finished tire, ⅛ x 1½ in. and larger, 1.30c. base; under ⅛ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c. base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c.

Cold-Rolled Strip Steel.—Makers report a better demand, and several of the leading mills are now operating to 100 per cent. for the first time in some months. New orders are fairly active, and specifications against contracts are reported coming in freely. Prices are firm. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edges, per 100 lb., $2.75, delivered. Extras, which are standard among all the mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	$0.25	$0.10
0.099 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Rivets.—As yet conditions in the rivet trade have not shown much betterment, the demand being dull. We quote structural rivets at 1.40c. and cone-head boiler rivets at 1.50c., f.o.b. Pittsburgh. On an attractive order these prices would be slightly shaded.

Wrought Pipe.—The new demand for tubular goods in March did not show any increase over February, but it is expected to be heavier in April. Several fairly large gas and oil lines have been placed, and two or three others are reported in the market. The National Supply Company, this city, has taken 30 miles of 8-in. pipe for a gas line for shipment to Independence, Kan., and the Dominion Natural Gas Company has placed 23 miles of 8-in., one-third of which went to the Page-Hershey Iron & Steel Company, Welland, Ont., the remainder of the order to be furnished by a local mill. Another interest has taken 20 miles of 6-in. for shipment to Oklahoma, and a pipe mill in the Wheeling district is reported to have closed for 90 miles of 6-in. for a Western oil line. Discounts on iron and steel pipe are being slightly shaded in some cases, but on the whole are fairly well held.

Boiler Tubes.—There is no betterment in the demand for locomotive or merchant tubes, and specifications are quiet. Discounts are still more or less shaded, depending on the order.

Coke.—The only large local inquiry in the market is from the Pittsburgh Steel Company for 18,000 to 20,000 tons per month for the year beginning July 1, 1915. So far as known, no definite prices have yet been quoted on this inquiry, as coke makers are not inclined to sell for delivery a year ahead from next July as low as $1.75 per net ton at oven, and they are likely to ask $2 or even higher. It is probable that this week the Eastern Steel Company will close for 10,000 tons of coke for April and possibly for that amount for each month in the second quarter. There is little demand for spot coke and prices are not any better. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions for the week ended March 20 as 279,442 tons, a decrease of about 300 tons over the previous week. We quote standard makes of blast-furnace coke for prompt shipments from $1.50 to $1.60; on contracts for delivery up to July 1, $1.65, and for delivery over all of 1915, at $1.75 per net ton at oven.

Old Material.—Consumers have covered their needs for some little time and are out of the market as buyers. The new demand is therefore dull, but prices are holding up fairly well. Bids on the Pennsylvania Railroad list are to be in by April 6, and awards will be made not later than April 9. There is an inquiry out for 800 to 1000 tons of low phosphorus melting stock, which has been very dull for some time. Prices are unchanged. For delivery in Pittsburgh and nearby districts that take Pittsburgh freights, dealers quote about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$12.00 to $12.25
Compressed side and end sheet scrap	10.25 to 10.50
No. 1 foundry cast	12.00 to 12.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock	10.00 to 10.25
Railroad grate bars	8.50 to 8.75
Low phosphorus melting stock	13.25 to 13.50
Iron car axles	18.75 to 19.25
Steel car axles	13.25 to 13.75
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	9.75 to 10.00
No. 2 busheling scrap	7.00 to 7.25
Machine shop turnings	8.00 to 8.25
Old carwheels	10.75 to 11.00
Cast-iron borings	8.25 to 8.50
*Sheet bar crop ends	12.00 to 12.25
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.75 to 11.00
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	10.75 to 11.00

*Shipping point.

The name of the Modern Steel Structural Company, Waukesha, Wis., has been changed to Federal Bridge Company. C. J. McIntosh is president; J. T. Cheney, vice-president; R. A. Raschig, treasurer; G. W. Helmer, secretary, and G. A. Haynes, chief engineer.

Chicago

CHICAGO, ILL., March 31, 1915. (*By Wire.*)

The lighter steel products, including wire, bars and sheets, are, generally speaking, moving more steadily and actively than the heavier tonnage materials. Plate business is scarce, and structural orders are of a straggling kind involving only unimportant tonnage. Several lots of rails are under consideration, though none of the contracts now in prospect of being placed runs into very large figures. A very considerable aggregate of spikes and track bolts is under negotiation. The business in standard, carriage and machine bolts is now on a much sounder basis, and following the advance in prices just announced specifications have been much improved. The local pig-iron market is enlivened only slightly by the reflection of activity in other districts, as shown in an increase of inquiry for second half. There is no apparent inclination on the part of the furnaces to excite interest by means of attractive price propositions. There has been a fair volume of trading in scrap, but much too small a quantity is being moved to relieve the weight of old material accumulations, and the market is still sagging.

Pig Iron.—Opinion as to the progress of the pig-iron market varies in accordance with experience, of which there is a considerable range. Additional inquiry is noted in some quarters, particularly for special iron, in connection with which advantageous prices can be made. But for the most part last half inquiry appears to be subsiding and there is no evidence pointing to a considerable movement of iron such as has been in process elsewhere. The very low price at which iron is now being held in this district, the tonnage now past due for delivery on existng contracts and the large proportion of furnace capacity still idle in this section, are conditions operating against a furnace campaign for last half orders on the basis of attractive quotations. Local furnaces are holding at $13 at furnace, which can be done for the last half as well as the remainder of the first, although some sellers ask a premium on last half shipments. Southern iron is scarcely moving in this market and the tonnage involved makes the question of prices of small importance. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	$15.75
Lake Superior charcoal, No. 1	16.25
Lake Superior charcoal, No. 6 and Scotch	16.75
Northern coke foundry, No. 1	$13.25 to 13.50
Northern coke foundry, No. 2	13.00 to 13.25
Northern coke foundry, No. 3	12.50 to 13.00
Southern coke, No. 1 f'dry and 1 soft	13.75 to 14.25
Southern coke, No. 2 f'dry and 2 soft	13.50 to 13.75
Malleable Bessemer	13.00 to 13.25
Standard Bessemer	15.50
Basic	12.50 to 13.00
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. silv'y, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—Several small contracts for rails are reported pending, but the tonnage taken last week is insignificant. There has been more activity in the placing of orders for track bolts and spikes, a number of the roads west and north having been unusually tardy in covering. Little improvement in prices can be found. We quote standard railroad spikes at 1.45c. to 1.50c., base; track bolts with square nuts, 1.90c., base, all in carload lots, Chicago; tie plates, $23.50 to $25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

Structural Material.—Measured by all normal standards, structural tonnage recently booked is meager indeed. The local fabricators are running pretty light, but all seem to have something in their shops for which plain material is required continuously. Fabricated work is being taken at exceptionally low prices admitting of no possible profit. The only contract of importance reported for the week was the Cook store build-

ing at Chicago for which A. Bolter's Sons will furnish 484 tons. The Milwaukee Structural Steel Company will fabricate 165 tons for a warehouse for the Pritzlaff Hardware Company, Milwaukee. No new car business has appeared, although it is reported that the Minneapolis & St. Louis Railroad will buy 1000 cars and the International & Great Northern a like number. There is also inquiry for a small amount of passenger equipment. Mill prices are being uniformly maintained, although the lack of incentive to concessions may be in a measure responsible. We quote for Chicago delivery of plain material from mill 1.339c.

The customary lull in buying which appears the last week in the month is apparent in the current store business in structural material. Prices are without change and we quote for delivery out of store at Chicago 1.75c.

Plates.—Western plate mills continue to profit at the expense of makers in Eastern districts, in the booking of tank plate tonnage for the Southwest where erecting operations are largely under union control. Even with this business, mill schedules are exceedingly light, and with the exception of the leading interest, operations are but inadequately assured. The plate market presents an exception to the mills' attitude of firmness with respect to the heavier products, and for any moderately attractive tonnage 1.10c., Pittsburgh, can be done. We quote for Chicago delivery of plates from mill 1.289c. to 1.339c.

The store business shows a much better volume of orders for the lighter products, and plates, particularly in the heavier weights, are accordingly neglected. We quote for Chicago delivery of plates out of stock 1.75c.

Sheets.—Although the mills at Chicago have moderated their attitude but little, in connection with the sale of galvanized sheets, quotations from Ohio mills in the past week indicate a willingness to take business on the basis of 3.30c. at the mill, in fair tonnages. Quotations equivalent to 3.40c., Pittsburgh, are, however, more general. Business in black sheets is moving along without incident, although an adjustment of the wage situation has in it possibilities of affecting the market. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.489c. to 1.539c.; No. 28 black, 1.939c. to 1.989c.; No. 28 galvanized, 3.589c.

We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.65c. to 3.75c.

Bars.—Bars, both iron and steel, are moving in a limited way and without special incident. Implement specifications for steel bars continue to come in at a better rate than a month ago. Bar-iron orders are scattering and insufficient in volume to result in accumulations at the mills sufficient to insure satisfactory rolling schedules. Prices are less subject to concessions than the lack of business might suggest. We quote for mill shipments as follows: Bar iron, 1.12½c. to 1.15c.; soft steel bars, 1.339c.; hard steel bars, 1.20c.; shafting in carloads, 65 to 68 per cent. off; less than carloads, 60 to 65 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 62 per cent. off.

Rivets and Bolts.—Following the advance in bolt prices last week, specifications on contracts expiring with the first quarter noticeably increased, and contracting for second quarter requirements is progressing with considerable animation. The market appears to be in a more satisfactory situation than has obtained for a considerable period, and one Western plant reports that it is now operating at capacity. Quotations are as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-15; cut thread, 80-10; larger sizes, 75-17½; machine bolts up to ⅜ x 4 in., rolled thread, 80-20; cut thread, 80-15; larger sizes, 80-2½; coach screws, 85-2½; hot pressed nuts, square, $6.60 to $6.40 off per cwt.; hexagon, $7.60 to $7.30 off per cwt. Structural rivets, ¾ to 1¼ in., 1.50c. to 1.55c., base, Chicago, in carload lots; boiler rivets, 10c., additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to ⅞ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅞ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Wire Products.—The movement of wire, although still exceptionally good in some quarters, appears not to have been so uniformly heavy in the past week. This trade, however, is still an important factor in supporting the general scale of mill operations. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.589; wire nails, $1.789; painted barb wire, $1.789; galvanized barb wire, $2.289 to $2.389; polished staples, $1.789; galvanized staples, $2.289 to $2.389, all Chicago.

Cast-Iron Pipe.—The award of 700 tons of pipe at Billings, Mont., is reported to have been made to the American Cast Iron Pipe Company, while at Grand Rapids, Mich., the Lynchburg Foundry Company will take 3000 tons. The leading interest will furnish 275 tons for Fredonia, Kan., and 700 tons of 36 in. pipe for Cincinnati, Ohio. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $23.50; 16 in. and up, $23, with $1 extra for gas pipe.

Old Material.—The quantity of scrap apparently available for sale in this market appears much in excess of any consumptive demand of which there is a nearby prospect. This situation is not relieved by the railroad offerings of old material which are likely to increase rather than otherwise during the next several weeks. Approximately 12,000 tons, including 7250 tons from the Chicago & Northwestern and 4300 tons from the Rock Island, are in the market this week. The accumulation of scrap is such that market values continue to decline despite a very fair trading throughout the week. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$12.00 to $12.25
Old steel rails, rerolling	10.25 to 10.75
Old steel rails, less than 3 ft.	10.00 to 10.50
Old carwheels	9.75 to 10.00
Heavy melting steel scrap	9.25 to 9.50
Frogs, switches and guards, cut apart	9.25 to 9.50
Shoveling steel	8.75 to 9.00
Steel axle turnings	7.00 to 7.25

Per Net Ton

Iron angles and splice bars	$11.50 to $12.00
Iron arch bars and transoms	11.75 to 12.25
Steel angle bars	8.50 to 8.75
Iron car axles	13.75 to 14.00
Steel car axles	11.25 to 11.75
No. 1 railroad wrought	9.00 to 9.25
No. 2 railroad wrought	8.50 to 8.75
Cut forge	8.50 to 8.75
Steel knuckles and couplers	8.50 to 8.75
Steel springs	9.00 to 9.50
Locomotive tires, smooth	8.50 to 9.00
Machine shop turnings	5.25 to 5.50
Cast borings	4.75 to 5.25
No. 1 busheling	7.75 to 8.00
No. 2 busheling	6.75 to 7.00
No. 1 boilers, cut to sheets and rings	5.50 to 6.00
Boiler punchings	8.25 to 8.50
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	7.75 to 8.00
Grate bars	7.50 to 7.75
Railroad malleable	8.00 to 8.25
Agricultural malleable	7.25 to 7.50
Pipes and flues	6.75 to 7.00

Philadelphia

PHILADELPHIA, PA., March 30, 1915.

Certain of the mills which have a wide diversity of products are doing an excellent business. One reports that its present activity is 100 per cent. better than at this time a year ago. A good part of this business is derived direct from foreign countries which need semi-finished materials and a considerable portion is from demand which the war has created for finished products to be manufactured in this country. The activity in steel rounds for shrapnel and wire is especially marked. There is a good call for wrought pipe. The inactivity of the railroads is a continued sore point with those companies that are largely dependent on railroad business. Pursuing a policy of economy, the Pennsylvania Railroad has postponed the placing of its rail orders despite the fact that its tests of several specifications have been concluded. Billets are a little more active and the specifying of bars has been fairly good. Plates continue to show weakness. In plates, shapes and bars an advance of $1 per ton is looked for April 1. The heavy selling of Buffalo pig iron had no great effect on this market, which continues quiet. The big movement, of course, is the

uppermost topic of conversation in the pig-iron trade. The demand for heavy melting steel is easier.

Iron Ore.—New business is wanting. Arrivals at this port in the week ended March 27 consisted of 7300 tons from Chile and 6450 tons from Cuba.

Pig Iron.—For the most part, demand has been quiet in this district though a little betterment in inquiry is noticed in some directions. Sales by Buffalo interests were light here and not to be compared in any way with the sensational movement in other territories. The chief reason for the comparative inactivity of Buffalo iron in this vicinity is that its delivered price, based on $12 at furnace, is $14.58. One seller of Buffalo iron estimates that he placed probably 10,000 tons during the selling campaign, while last week he sold about 8000 tons. Other sellers are believed to have done less. Inquiry now before the trade is very largely confined to carload lots. The present quotations given out here for Buffalo No. 2 X is $13 at furnace for last half delivery, and $12.50 for first half. A dealer in Virginia iron sold and shipped more of his product in March than in the preceding month. His March sales totaled 4200 tons against 690 tons in February, but this was due in part to his filling orders for another company whose furnace is out of blast. There is no change in the price of Virginia iron. Southern iron has been inactive and evidence of weakness is noted. A sale of mottled iron at $8, Birmingham, is said to have been made. Low phosphorus is in poor demand. Further inquiries from abroad have been received, but they are slow in developing. Most of them come from Mediterranean countries. The only activity reported in basic is the sale of 1500 tons for the manufacture of small billets used in making automobile forgings. Pipe makers are showing interest in the market to an extent which inspires the belief that there will be some buying on their part very soon. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2X, foundry	$14.25 to $14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia No. 2X, foundry	15.25
Virginia No. 2 plain	15.00
Gray forge	13.25 to 13.50
Basic	13.50
Standard low phosphorus	20.00 to 20.50

Ferroalloys.—There have been two arrivals of 80 per cent. ferromanganese in this country in the last week, but both shipments are so special in character that the general situation is unchanged. At Philadelphia 300 tons arrived and at Baltimore 260 tons. In both cases, according to report, the arrivals can be traced to an understanding reached between the British admiralty and an American steel company that is making munitions of war for the British Government. Another arrival at this port consisted of 200 tons of spiegeleisen from England. While the nominal quotation for ferromanganese is $78, seaboard, none could be obtained at this figure. Those who have small quantities can dispose of it at prices ranging from 6.50c. to 7.50c. per lb. The quotations for 50 per cent. ferrosilicon are $71 to $73, Pittsburgh.

Bars.—Specifications for ordinary steel bars and sheet bars were rather good last week. Frequent inquiries are received for the latter from exporters, but in many cases nothing more is heard of them after quotations are submitted. On the whole, new business is quiet. For delivery in the latter part of March 1.309c. has been quoted on steel bars, but it is understood that $1 per ton more, or 1.359c., will be asked April 1. Iron bars are still quotable at 1.15c. to 1.20c., Philadelphia, though for some grades, 1.05c., mill, or 1.129c., Philadelphia, can be done.

Plates.—Miscellaneous specifications have been better and one mill which operates largely on such business has run at the rate of about 75 per cent. of capacity. While quotations for late March delivery have been 1.309c., Philadelphia, lower has been done, beyond doubt. This has been particularly true in supplying the shipbuilders. With some mills boat specifications are becoming lighter and it is wondered what will take their place when they entirely subside, inasmuch as the railroads show but little activity. In one case a proffer of an order for about 600 tons of ship plates for export was declined, partly on account of price, but also because gross tons were specified and the extras were not attractive. After April 1, local mills will advance their quotation to 1.359c. for April delivery.

Rails.—The only feature in the rail situation, which is a quiet one, is further inquiry from abroad, especially from Russia and Australia. The Pennsylvania Railroad has postponed the placing of its orders.

Structural Material.—The only live projects in this vicinity are an apartment building in this city, for which Frederick Webber has asked estimates on 750 tons, and a warehouse for the Hunter & Dickson Company, Washington and Delaware avenues, Philadelphia, for which bids have been asked on 150 tons. Although it has been announced that the price will be advanced to 1.359c. April 1, it is admitted that in the absence of any real test of the market it is not known how well this price will hold.

Sheets.—Local sheet makers find no change in the market either for the better or otherwise and quotations are unchanged at 1.459c. to 1.509c., Philadelphia, for No. 10 blue annealed.

Billets.—In the past few days there has been a betterment in specifications for steel billets and inquiry for them is freer. Basic open-hearth rolling steel is quoted at $21.52, Philadelphia, with forging steel about $4 per ton over this price.

Coke.—Inactivity continues. The heavy selling of recent date by Buffalo pig-iron interests makes still more dubious the purchase of furnace coke by eastern Pennsylvania merchant furnaces. Quotations for prompt delivery standard Connellsville furnace coke are $1.50 to $1.60 per net ton at oven. Contract furnace up to the end of the year is quoted at $1.75. Prompt foundry quotations range from $2 to $2.35. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The demand for heavy melting steel, which is the only item in the list in which there has been any considerable activity, is quieter, though just why is difficult to explain unless it is that the mills recently took enough to satisfy their immediate needs. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$11.00 to $11.50
Old steel rails, rerolling	11.00 to 11.50
Low phos. heavy melting steel scrap	14.25 to 14.50
Old steel axles	14.00 to 14.50
Old iron axles	17.50 to 18.00
Old iron rails	13.00 to 14.00
Old carwheels	11.00 to 11.50
No. 1 railroad wrought	12.50 to 13.00
Wrought-iron pipe	10.00 to 10.50
No. 1 forge fire	8.00 to 8.50
Bundled sheets	9.00 to 9.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	8.25 to 8.75
Cast borings	8.00 to 8.50
No. 1 cast	12.00 to 12.50
Grate bars, railroad	8.75 to 9.25
Stove plate	8.75 to 9.25
Railroad malleable	9.00 to 9.50

Buffalo

BUFFALO, N. Y., March 30, 1915.

Pig Iron.—After reaching a total of not far from 400,000 tons, the Buffalo district selling movement at extraordinarily low prices inaugurated 10 days ago has come to an end and prices have risen to a slightly higher level. The buying was participated in by over 400 different consumers in New York State, New England and Atlantic Coast States, the largest single order reported being for 10,000 tons, with a very few of 4000 and 5000 each, and a considerable showing of 500 to 1000-ton lots. For the majority of sales approximately $12 at furnace was the price obtained, that being the ruling quotation for No. 2 X foundry and the ruling average for all grades, very slight regard being given to grade differentials. One producer is reported as having taken a number of orders at $11.75 and one or two at $11.50 at furnace. The extreme bottom was touched the latter part of last week, at which time two of the large producing interests announced a price ad-

vance to $12.50 furnace on No. 2 X foundry for second quarter deliveries and $13 for last half. One large furnace interest held the low schedule open until noon Monday before putting an advance into effect, coming in at that time with $12.50 as the minimum for second quarter. One other producer announced $12.50 as minimum for second and third quarter and $13 for fourth quarter. All sellers are now taking a firm stand in the restoration of prices and claim not to be aggressively looking for additional business even at the increased prices. The wide distribution of tonnage indicates that buying was upon a conscientious basis, and considering the number of foundries that have been operating on short time recently it also indicates to furnace interests a reserve demand which was surprisingly large. From shipping instructions so far received it is apparent that delivery of large amounts will be called for in April. Only a small proportion of the buying was for malleable iron, indicating that foundries selling to the railroad trade were not largely interested. Basic came in for 12,000 to 15,000 tons of the total, one order of 7500 tons being reported and one of 2500 tons, with several of 500 to 1000 tons. The price obtained for basic is said to be $12.75 at furnace for the larger portion taken, with a few small lots at $13. As was the case last week it is difficult to approximate a price schedule for the several foundry, malleable and basic grades. A graded schedule can only be approached by taking $12.50 furnace for No. 2 X foundry, second and third quarter delivery, and $13 furnace for fourth quarter, as a base and adding 25c. or 50c. per ton for No. 1 and deducting 25c. for the low grades. Furnacemen state that some iron has been sold under competition at the advance which has been effective for a day or two for second quarter delivery.

Finished Iron and Steel.—The flurry in pig iron does not appear to have affected finished steel. The 1.15c. price on bars, plates and shapes will be withdrawn on March 31 and the prices for April will be on the 1.20c. basis for new business. Some selling interests which sent out notices of this increase, effective April 1, state that it has tended to hurry forward March specification and shipments and to the taking up of full quotas on contracts expiring April 1. There are no indications of any lack of strength in the price situation. It is expected that bolts will be advanced April 1. There has been an increase in the number of estimates asked on fabricated material. Prices are being figured very low because of conditions in the fabricating shops, some of them being practically destitute of orders. Other shops, however, report a fairly good run of business in hand and developing. The Ferguson Steel & Iron Company has 300 tons of steel for the first building of the plant of the Curtiss Aeroplane Company, Buffalo. Bids are being taken this week for the Carpenter apartments, Richmond avenue, Buffalo, 100 tons, and also for a considerable tonnage for an 11-story warehouse and factory for the William H. Walker Company.

Old Material.—Last week's activity still continues. More interest has been shown by buyers than for some time. Several good sized orders for heavy melting steel have been placed by local users, as well as from points outside of the district. The large amount of scrap held by the dealers which is available and their inclination to sell counteracts any tendency toward increase in prices at present and no price changes are reported for any commodity. Some dealers, however, hold to the belief that prices will soon advance. We continue last week's schedule of dealers' selling prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$10.50 to $10.75
Low phosphorus steel	13.00 to 13.50
No. 1 railroad wrought scrap	10.00 to 10.50
No. 1 railroad and machinery cast	10.50 to 11.00
Old steel axles	12.00 to 12.50
Old iron axles	16.00 to 16.50
Old carwheels	10.50 to 11.00
Railroad malleable	9.50 to 10.00
Machine shop turnings	5.75 to 6.25
Heavy axle turnings	8.50 to 9.00
Clean cast borings	6.50 to 7.00
Old iron rails	11.00 to 11.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.25 to 8.75
Wrought pipe	6.50 to 7.00
Bundled sheet scrap	7.25 to 7.75
No. 1 busheling scrap	8.50 to 9.00
No. 2 busheling scrap	6.00 to 6.50
Bundled tin scrap	9.00

Cincinnati

CINCINNATI, OHIO, March 31, 1915. (*By Wire.*)

Pig Iron.—The absence of business is intensified. It is worthy of note that dealers generally believe a period of unprecedented dullness is followed by a corresponding period of activity. To a certain extent present conditions may justify such a prediction. Contracting for last half requirements has been postponed by many consumers of foundry iron, although a number of local foundries are operating up to maximum capacity. The melt of iron has also increased in other nearby manufacturing centers, but the low prices that have prevailed for some time, coupled with the competition for orders, have not been encouraging factors in the situation. Rumors are circulated to the effect that Southern producers are endeavoring to stiffen prices, but the slack demand, as well as low offers of warrant iron, has tended to forestall this effort, and up to the present time it has not been successful. A northern Michigan manufacturer has bought 6000 tons of iron for last half delivery, made up of 3500 tons of foundry iron from a Lake furnace, 1100 tons of Ohio silvery, and 1400 tons of Lake Superior charcoal. A small lot of Southern foundry was also taken by the same purchaser. The Hanging Rock furnaces are holding out for a minimum of $12.75, Ironton, but the majority of them are willing to insert this figure in last half contracts. The only foundry inquiry of note is from central Ohio for 5000 tons of mixed grades for July-December shipment. Ohio silvery irons have again shown some activity, with quotations unchanged. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$12.65 to $13.15
Southern coke, No. 2 f'dry and 2 soft	12.15 to 12.65
Southern coke, No. 3 foundry	11.65 to 12.15
Southern No. 4 foundry	11.15 to 11.65
Southern gray forge	10.65 to 11.15
Ohio silvery, 8 per cent. silicon	16.01 to 16.26
Southern Ohio coke, No. 1	15.01 to 15.51
Southern Ohio coke, No. 2	14.01 to 14.51
Southern Ohio coke, No. 3	13.76 to 14.01
Southern Ohio malleable Bessemer	14.26
Basic, Northern	14.26
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—The furnace coke inquiry reported last week as being received from a consumer outside of this territory has not yet been closed. The only encouraging feature of the furnace coke situation is that consumers are taking shipments on contract time. This same condition exists as far as the foundry grades are concerned, but the only new business is for carload lots for immediate requirements. It is expected that considerable foundry contracting will be done in April. We quote Connellsville 48-hr. coke at $1.50 to $1.60 per net ton at oven for prompt shipment, and from $1.60 to $1.75 on contracts. Prompt foundry coke is quoted from $2 to $2.25. Wise County and Pocahontas producers are naming prices about 10c. to 25c. a ton higher.

Finished Material.—The nearby rolling-mill operators are in a better frame of mind than at this time last week. The settlement with the Amalgamated Association has enabled the Newport Rolling Mill Company, Newport, Ky., to start up in full. The receipt of some large orders for forging billets reported by the American Rolling Mill Company, Middletown, Ohio, has enabled that company to start up, at maximum capacity, different departments of the three mills under its control. It is understood that these orders are from car builders. There has been some domestic improvement in the demand for both black and galvanized sheets, as compared with business in the previous 30 days. We quote No. 28 black sheets around 1.85c. to 1.90c. and No. 28 galvanized 3.40c., f.o.b. Pittsburgh. The expected spring demand for reinforcing concrete bars and other building material has not developed to any considerable extent. Confirmation has been received of a large order booked by a manufacturing plant in this territory for a large number of shrapnel cases in the rough. Other smaller concerns equipped with forging plants are understood to have booked some rush business, most of which was sublet to them.

Old Material.—The market continues uninteresting. All prices are soft, and it would be difficult to state at what figure a desirable tonnage of any kind of scrap could be bought. Some dealers state that they are being held up on contract shipments. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

	Per Gross Ton	
Bundled sheet scrap	$6.75 to	$7.25
Old iron rails	11.00 to	12.00
Relaying rails, 50 lb. and up	19.75 to	20.25
Rerolling steel rails	9.75 to	10.25
Melting steel rails	9.00 to	9.50
Heavy melting steel scrap	9.00 to	9.50
	Per Net Ton	
No. 1 railroad wrought	$8.50 to	$9.00
Cast borings	4.50 to	5.00
Steel turnings	4.50 to	5.00
Railroad cast scrap	9.50 to	10.00
No. 1 machinery cast scrap	10.25 to	10.75
Burnt scrap	6.50 to	7.00
Old iron axles	14.00 to	14.50
Locomotive tires (smooth inside)	9.00 to	9.50
Pipes and flues	6.00 to	6.50
Malleable and steel scrap	7.00 to	7.50
Railroad tank and sheet scrap	5.00 to	5.50

Cleveland

CLEVELAND, OHIO, March 30, 1915.

Iron Ore.—The recent heavy buying of pig iron in Buffalo at low prices is not expected to encourage an early activity in the iron ore market, and a buying movement is not looked for before May. We repeat 1914 prices as follows: Old Range Bessemer, $3.75; Mesaba Bessemer, $3.50; Old Range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—The heavy buying in Buffalo at low prices has not affected prices in this territory or stirred up any activity in the local market. In fact, it has caused consumers to hold off for a possible slump in prices in this territory. While sellers show no inclination to quote lower prices than have been prevailing, practically no inquiry has come out since the Buffalo buying started to test the market in this territory. In Erie a fair volume of activity developed, but conditions were met by the local furnace. A Valley producer was offered $12.50 for 500 tons of No. 2 foundry, but refused to take the business at that price. Local and Valley furnaces continue to ask $12.75 to $13 for No. 2 foundry for the last half. While competition for business for shipment to Indiana points has recently resulted in lower prices, one leading seller in that territory states it has not taken business below $12.50 for No. 2. Southern iron is quiet with prices unchanged. We quote, delivered, Cleveland, as follows:

Bessemer		$14.55
Basic		13.45
Northern No. 2 foundry	$13.25 to	13.50
Southern No. 2 foundry	13.50 to	13.75
Gray forge		13.00
Jackson Co. silvery 8 per cent. silicon	16.37 to	16.62
Standard low phos. at furnace	19.75 to	20.00

Coke.—Foundry coke shipments on contracts show considerable improvement, but the market is very dull, there being little inquiry for spot coke and none for the last half contracts. We quote the best makes of standard Connellsville foundry coke at $2.25 to $2.50 per net ton at oven. Standard furnace coke is held at $1.50 to $1.60 for spot shipment.

Finished Iron and Steel.—Orders for over 100,000 tons of steel bars for export to France have been placed with a Central Western steel company, and another order for 30,000 tons is pending. The contract for this steel was given to a buyer in this district who has placed it with a lower Lake mill. The steel will go to an important French interest which will distribute it for war and other purposes. Specifications have been received for 45,000 metric tons, calling for 2-in. and 3-in. rounds in special steel, and specifications for 46,000 tons are on the way. Deliveries are to be made at the rate of 25,000 tons a month. Another order for steel for making shrapnel shells has been placed by a Cleveland manufacturer with the Lackawanna Steel Company, this being for 2800 tons of bars. Specifications on 1.10c. contracts, which expire March 31, have been coming out quite freely, and very little tonnage remains unspecified. The market is firm and leading mills announce that they will quote the 1.20c., Pittsburgh, price beginning April 1. However, most consumers are under contract at 1.15c. for that delivery. There is still some shading of plate prices to 1.10c., Pittsburgh, by one or more of the smaller mills. Several sales of open-hearth sheet bars have been made for April delivery at $20, Youngstown. The structural situation is quiet locally, but there is an improved demand throughout the State, and several orders have been placed with Ohio fabricators for work requiring lots of 500 tons and under. The Dyer Company, Cleveland, has placed with the Toledo Bridge & Crane Company 350 tons for a sugar factory at Payson, Utah. The Willys-Overland Company has placed a contract for 350 tons for a building for the Morrow Mfg. Company, Elmira, N. Y., a subsidiary company, with the McClintic-Marshall Company. The demand for sheets is quite active. Black sheets are generally quoted at 1.80c. to 1.85c. Ohio mills, for No. 28. However, quotations down to 1.75c. are being made to jobbers. We quote No. 28 galvanized sheets at 3.40c., Ohio mill, and No. 10 blue annealed sheets at 1.30c. to 1.35c. The demand for bar iron is dull. Cleveland mills are now making quotations on a Pittsburgh and Chicago basis instead of a local mill price as heretofore. We quote iron bars at 1.10½c., Pittsburgh, and 1.13½c., Chicago. Warehouse prices are 1.80c. for steel bars, and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—Bolt and nut specifications show an improvement and quite a number of contracts are being placed for the second quarter. The advance in prices noted last week is being well maintained. Rivets are quoted at 1.40c. to 1.45c., Pittsburgh, for structural, and 1.50c. to 1.55c. for boiler. Bolt and nut discounts are as follows: Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 80 and 15 per cent.; cut thread, 80 and 10 per cent.; larger or longer, 75 and 17½ per cent.; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 80 and 2½ per cent.; coach and lag screws, 85 and 2½ per cent.; square h.p. nuts, blank or tapped, $6.40 off; hexagon h.p. nuts, blank or tapped, $7.30 off; c.p.c. and t. square nuts, blank or tapped, $6.10 off; hexagon, ⅝ in. and larger, $7.60 off; 9/16 and smaller, $8.30 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10, 10 and 5 per cent.; 9/16 and smaller, 85, 10, 10, 10 and 5 per cent.

Old Material.—There is little demand and prices are weak. Dealers having material that they were anxious to move have sold small lots at considerable concessions in price. A Cleveland consumer is offering $10.25 for heavy melting steel. Steel and iron car axles are about 50c. a ton lower. A sale of steel axles is reported at $12.50. Railroad wrought and railroad malleable are also from 25c. to 50c. a ton lower. Old carwheels are weaker, having sold below $10. Scrap is very dull in the Mahoning Valley. For Youngstown delivery heavy melting steel is quoted at $11 to $11.50. We quote, f.o.b. Cleveland, as follows:

	Per Gross Ton	
Old steel rails, rerolling	$11.00 to	$11.75
Old iron rails		12.00
Steel car axles	12.25 to	12.50
Heavy melting steel	10.00 to	10.50
Old carwheels	9.85 to	10.00
Relaying rails, 50 lb. and over		22.50
Agricultural malleable	8.00 to	8.50
Railroad malleable	10.00 to	10.25
Steel axle turnings	9.00 to	9.50
Light bundled sheet scrap	8.00 to	8.50
	Per Net Ton	
Iron car axles	$15.50 to	$15.75
Cast borings	6.00 to	6.25
Iron and steel turnings and drillings	5.50 to	5.75
No. 1 busheling new	8.75 to	9.00
No. 1 busheling old	8.50 to	8.75
No. 1 railroad wrought	9.50 to	9.75
No. 1 cast	10.00 to	10.50
Stove plate	8.25 to	8.50

E. A. Schwarzenberg, scrap iron dealer, will move his office April 1 from the Garfield Building, Cleveland, to 1424 Leader-News Building.

St. Louis

ST. LOUIS, March 29, 1915.

Pig Iron.—Sales were limited to small lots and the local market is about devoid of inquiries to-day. An early improvement is not expected from present prospects. Southern No. 2 is quoted at $9.50 to $10 per ton, Birmingham, with a freight rate to St. Louis of $3.40. Northern iron, which is less in demand than Southern, is offered at $13 to $13.50, Chicago.

Coke.—One local agent reports a sale of 6000 to 10,000 tons of coke in Iowa last week. The market is dull, and prospects are somewhat gloomy.

Old Material.—There has been very little buying, as the mills appear to be well supplied and are not anxious to make further purchases at this time. Prices are holding firm, with the exception of a few slight variations on several grades. No railroad lists of importance are out, and dealers seem confident that the minimum has been reached in prices. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton	
Old iron rails	$10.50 to $10.75
Old steel rails, rerolling	10.25 to 10.50
Old steel rails, less than 3 ft.	11.50 to 12.00
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.25 to 10.50
No. 1 railroad heavy melting steel scrap	9.50 to 9.75
Shoveling steel	8.75 to 9.00
Frogs, switches and guards cut apart	9.75 to 10.00
Bundled sheet scrap	6.00 to 6.25

Per Net Ton	
Iron angle bars	$10.75 to $11.00
Steel angle bars	9.00 to 9.25
Iron car axles	15.00 to 15.50
Steel car axles	10.75 to 11.00
Wrought arch bars and transoms	11.25 to 11.50
No. 1 railroad wrought	8.25 to 8.50
No. 2 railroad wrought	8.00 to 8.25
Railroad springs	8.75 to 9.00
Steel couplers and knuckles	9.00 to 9.25
Locomotive tires, 42 in. and over, smooth inside	9.00 to 9.25
No. 1 dealers' forge	7.50 to 7.75
Mixed borings	5.25 to 5.50
No. 1 busheling	7.75 to 8.00
No. 1 boilers, cut to sheets and rings	6.25 to 6.50
No. 1 railroad cast scrap	9.50 to 10.00
Stove plate and light cast scrap	8.00 to 8.25
Railroad malleable	7.25 to 7.50
Agricultural malleable	6.75 to 7.00
Pipes and flues	6.25 to 6.50
Railroad sheet and tank scrap	6.25 to 6.50
Railroad grate bars	7.50 to 7.75
Machine shop turnings	5.75 to 6.00

Birmingham

BIRMINGHAM, ALA., March 29, 1915.

Pig Iron.—The exact position of Birmingham iron is difficult to determine. However, it is certain that no disposition to shade $9.50 is manifest. One of the best-posted brokers says: "I cannot see how under $9.50 can be done in Birmingham now, because I know of two round lots just sold which brought $9.50." It is further known that the Middle West has taken several thousand tons of Birmingham iron at $9.50 and small lots at $9.50 to $9.75. There has been a determined effort to hammer the Birmingham market to $9.25 with Tennessee iron as a cudgel. There was so little of the Tennessee metal thus offered that it failed to upset the general basis. One concern sold 10,000 tons the past week in Southern territory, comprising one round lot and several smaller ones, at $9.50 to $9.75. Another reports selling more than its make. Some iron has been sold into the third quarter at prices now prevailing. There is reluctance to sell at $9.50 into the fourth quarter, $9.75 being demanded, unless the third quarter is included and it is a good round lot. The inclination on the part of the consumer to pay slightly above the No. 2 foundry basis for lower grades is manifest. The movement of pig iron is heavier than for some time and the foreign movement of steel billets is reported as regular, although the scarcity of ship room and notably high freight rates still prevent what would otherwise be a very large foreign outgo. The Underwood tariff is vehemently scored in Birmingham newspapers by such men as James Bowron, president Gulf States Steel Company, and Paschal Shook, a prominent iron man, and by others who see in it the loss to the Ensley mill of the Illinois Central's order for rails given in Canada. Mr. Shook has produced evidence of an offer of Belgian rails made prior to the war, but after the Underwood tariff went into effect, for delivery in Birmingham at a price under that of the Ensley mill. Mr. Bowron says the industrial depression was here "before the war" in Europe started. Only one charcoal furnace is in operation in Alabama, that at Rock Run, but it is understood that one stack at Shelby is to resume at an early date. About 7000 tons of charcoal iron is on the yards in Alabama. We quote, per gross ton, f.o.b. Birmingham furnaces, for large and small lots, as follows:

No. 1 foundry and soft	$10.00 to $10.25
No. 2 foundry and soft	9.50 to 9.75
No. 3 foundry	9.00 to 9.25
No. 4 foundry	8.75 to 9.00
Gray forge	8.50 to 8.75
Basic	9.50 to 10.00
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—The water and gas pipe makers are looking to a continuance of the steady demand and satisfactory output, but the makers of soil pipe have been much disappointed with recent business and are running at not over 50 per cent. capacity. The Anniston plant of the United States Cast Iron Pipe & Foundry Company has obtained a large order for gas mains from the Alabama Power Company and is enlarging its Bessemer plant to take care of the business. Pipe makers are nibbling at the iron market, a suggestion of a good trade outlook on their part. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $20; 6-in. and upward, $18, with $1 added for gas pipe.

Coal and Coke.—There is still little to say of coal. The output is not over 50 per cent. of capacity and mining operators do not report much profit in the business going. Coke is irregular, but prices appear to hold their own, with a wide range for different grades. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $3; foundry, $3 to $3.50.

Old Material.—Dealers again report a considerable demand for steel scrap, but nothing eventful in any other direction. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.00 to 12.50
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.00 to 7.50
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	8.50 to 9.00
Stove plate	8.00 to 8.50

New York

NEW YORK, March 31, 1915.

Pig Iron.—The echoes of the heavy selling of Buffalo pig iron reported last week have been widespread. Nothing in the pig iron market in months has stirred up so much interest. The surprising thing about the whole movement was the alacrity with which consumers responded to the reduced quotations. It would seem that many had made up their minds to buy if the market dropped back to $12, which was the basis of the November buying, and when some producers suddenly named that price the effect was much more pronounced than any one could have predicted. There is some doubt as to the course of one large interest which was the chief buyer in the November movement, but in this case negotiations were on at the end of last week. Otherwise 10,000 tons seems to be the largest sale made. It is estimated that several hundred foundries in New York State, New England and New Jersey took on most of the iron they will need or that they estimate they will need in the second half of the year. The tendency in trade comment is rather to emphasize the confidence with which foundrymen covered for their needs than the fact that a number of important furnace interests were willing to sell their capacity for months ahead at a low price. A number of malleable foundries were among the buyers, but little basic iron was sold—probably from 10,000 to 15,000 tons. Several users of such iron will need to buy later in the year. The

amount of iron sold from Buffalo in Pennsylvania was much less than on the last movement, the 5 per cent. advance in freight rates being that much increase in the handicap of Buffalo furnaces in territories not naturally tributary to them. In the latter part of last week one Buffalo producer raised its prices to $12.50 at furnace for No. 2 X, delivered in the second quarter, and $13 at furnace for the second half. Another producer is now out of the market and in a third case the range of quotations for second half is not definitely fixed. It appears that some buyers who did not know of the movement until it was well along were given a few days to get under cover at the original prices. The amount of iron sold on the $11.50 Buffalo basis is not definitely known, but that price was exceptional, the bulk of the 350,000 tons estimated to have been sold being at or close to the $12 basis. We quote as follows, at tidewater: No. 1 foundry, $14.25 to $14.50; No. 2 X, $14 to $14.25; No. 2 plain, $13.75 to $14; Southern iron, $14.50 for No. 1 and $14 to $14.25 for No. 2.

Ferroalloys.—The fact that in the last week 560 tons of British ferromanganese have been received, 300 tons at Philadelphia and 260 tons at Baltimore, is no assurance that the embargo is definitely lifted and general shipments to American consumers resumed. It is understood that the shipments mentioned are the result of an arrangement between the British admiralty and an Eastern steel company in this country, which is furnishing munitions of war for Great Britain, whereby 1000 tons will be forwarded for the company's use. Promises and hopes of early regular shipments to the trade continue to be held out to New York representatives by British producers, who are regarded as anxious and ready to make shipments. It is evident that the outcome rests entirely with the British Government. Last week a shipment was arranged for a particular boat, but later the vessel was withdrawn. Some representatives have cable advices of arrangements for shipments to New Orleans, Philadelphia and New York, with Baltimore freight facilities hard to get. It is the general feeling that the alloy will be received in April. In the meantime contracts for delivery, when obtainable, are being made at $78, seaboard. Sales of spot material are still heard of at $100 to $125. More anxiety is reported from some quarters than was the case last week. Ferrosilicon, 50 per cent., is quite active. Domestic sales of fair tonnages have been made and foreign inquiry has recently resulted in sales of considerable quantities at $71 to $73, Pittsburgh, the aggregate for March in one case exceeding records for some time. The ferrochrome market is suffering from a lack of chrome ore. The usual sources of the ore, New Caledonia, Asia Minor and Africa, have been cut off by embargo.

Later.—Cablegrams just received notify one New York representative of British producers of ferromanganese that definite arrangements have been made to ship about 5000 tons in the next two weeks. Barring accidents and sudden changes in freight facilities this should reach here by April 15.

Structural Material.—The 3000-ton loft structure to be erected on the site of the Hoffman House is expected shortly to be placed; bids are in for about 2000 tons for the Astor office building, to occupy the site of the southern half of the Astor House; bids are being asked of general contractors for 1200 tons for the McAlpin Hotel addition; 800 tons for Nagle packing house, Jersey City, has come into the market, and the Delaware, Lackawanna & Western is inquiring for about 400 tons for signal bridges and the New York Central for 200 tons of bridge work. Against these the following contracts have been closed: 300 tons for the Department of Docks and Ferries, Forty-sixth street and North River, awarded to Lewis F. Shoemaker & Co.; 500 tons for the Slattery loft, Twenty-fifth street and Madison avenue, to the Hedden Iron Construction Company; 1700 tons for the Ayer building, Twenty-sixth street and Broadway, to the Hay Foundry & Iron Works; 500 tons for the Chelsea warehouse, West 107th street, to Milliken Brothers; 250 tons for the New York Central, to Post & McCord; 600 tons for a bridge at Utica for the New York State Dredging Company, to the Phoenix Bridge Company; 300 tons for the Wheeler office building, Bridgeport, Conn., to Levering & Garringues Company; 400 tons for the Columbia Mills power house, to the Penn Bridge Company; 300 tons for the University of Pennsylvania Maternity Hospital, to the American Bridge Company, and 200 tons for the Rochester Business Institute, to F. L. Heughes & Co. These are now pending about 13,000 tons, against 10,000 tons a week ago, but to this should be added 5000 tons for subway work on which bids will be taken the middle of April. Small lots for minor building operations and repairs are moving actively, as is to be expected at this time. We quote mill shipments at 1.10c. to 1.15c., Pittsburgh, or 1.269c. to 1.319c., New York, and from store, 1.85c. to 1.90c., New York.

Plates.—The market shows no strength either in new buying or in prices. Recently about a carload lot was sold at less than 1.10c., Pittsburgh. In railroad cars the International & Great Northern is inquiring for 500 box, 300 gondola and 200 stock cars, 1000 in all, but this is more than balanced by the 1200 cars for the Missouri, Kansas & Texas, which, it is now thought, the road will not buy. There are accordingly less than 1200 cars before the market. About the only awards embrace 30 cars for the Central Railroad of New Jersey, awarded to the Harlan & Hollingsworth Corporation, and 6 cars for the Chicago & Great Western, awarded to the Pullman Company. We quote steel plates at 1.10c. to 1.15c., Pittsburgh, or 1.269c. to 1.319c., New York, and from store, 1.85c. to 1.90c., New York.

Steel and Iron Bars.—Some sellers report improvement in new buying as the second quarter approaches, while others report contrary conditions. Customers are being notified that unspecified tonnages will be cancelled on April 1, and that 1.20c., Pittsburgh, will hold thereafter. Domestic buying is nevertheless limited and little hope is expressed for offerings from the railroads for some time. The March spurt in foreign inquiry chiefly, for war material, continues, but deliveries are extended over three months owing to the scarcity of ships and the delays in unloading at destination. One of the latest inquiries is for about 49,500 short tons for soft steel bars for shrapnel shells with no restrictions regarding discard of ingot, etching the billet or carbon content, tensile strength and elongation alone being specified. There is a growing feeling that some concerns are short of acid steel for this business on contracts which they closed some time ago. We quote mill shipments of steel bars at 1.15c., Pittsburgh, or 1.319c., New York, and refined iron bars 1.20c. to 1.25c., New York. Out of store in New York we quote iron and steel bars at 1.80c. to 1.85c.

Cast-Iron Pipe.—Durham, N. C., will open bids April 21 on nine miles, or about 4000 tons, of 20-in. The Warren Foundry & Machine Company was the successful bidder last Friday on 800 tons of 6 to 14 in. at Wellesley, Mass. R. D. Wood & Co., Philadelphia, secured the contract for 650 tons of 6 to 12 in., on which bids were opened last Thursday by the Department of Water Supply, Gas and Electricity of the city of New York. The bid of this firm was about $1 per ton under the next lowest. A Canadian inquiry is in the market for about 10,000 tons of 48-in., but it is doubtful whether any manufacturer in this country will be able to do anything with it because of the very high Canadian duty. Some South American business is developing. A brisk demand is being received from private buyers, particularly for special classes and grades of pipe. Prices are at last moving upward, carload lots of class B and heavier being now quoted at $21 to $21.50 per net ton, tidewater, for 6-in., with class A and gas pipe selling at $1 per ton more.

Old Material.—Prices of steel scrap and rolling mill stock are weaker, with the subsidence of the demand from eastern Pennsylvania. The supply, as is usually the case when the demand falls, is much more plentiful and brokers are lowering their offers to dealers in this vicinity, making quotations per gross ton, New York, as follows:

Old girder and T rails for melting	$8.50 to $8.75
Heavy melting steel scrap	8.50 to 8.75
Relaying rails	19.00 to 19.50
Rerolling rails (nominal)	8.75 to 9.25
Iron car axles (nominal)	15.25 to 15.75
Steel car axles (nominal)	11.75 to 12.25
No. 1 railroad wrought	10.25 to 10.75
Wrought-iron track scrap	9.50 to 9.75
No. 1 yard wrought, long	9.50 to 9.75
No. 1 yard wrought, short	8.50 to 8.75
Light iron	3.25 to 3.75
Cast borings	6.00 to 6.25
Wrought turnings	6.25 to 6.50
Wrought pipe	8.00 to 8.25

Foundries are buying rather more freely, but not in large quantities. Quotations on cast scrap are as follows, per gross ton, New York:

Carwheels	$9.50 to $9.75
No. 1 heavy cast, broken up	10.50 to 11.00
Stove plate	7.75 to 8.00
Locomotive grate bars	7.00 to 7.50
Malleable cast	7.25 to 7.75

Boston

BOSTON, MASS., March 30, 1915.

Old Material.—Transactions have fallen off somewhat, but prices have not been changed. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	$8.25 to $8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	12.75 to 13.25
Old iron axles	20.25 to 20.75
Mixed shafting	12.00 to 12.25
No. 1 steel wrought and soft steel	8.25 to 8.75
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	7.00 to 7.50
Cotton ties (bundled)	5.25 to 5.75
No. 2 light	3.25 to 3.75
Wrought turnings	5.00 to 5.50
Cast borings	5.00 to 5.25
Malleable	7.50 to 7.75
Stove plate	7.00 to 7.50
Grate bars	5.25 to 5.50
Machinery cast (price to consumers)	11.25 to 11.50

British Pig Iron Higher

Railroads Gorged With Government Traffic — Rail Order for New Australian Company

(*By Cable*)

LONDON, ENGLAND, March 31, 1915.

Speculative buying is responsible for an advance of about 4s. (97c.) in warrants. General trade buying is reserved but more furnaces are expected to go out of blast at the end of the month. The number in blast is 166 against 171 one year ago. Stocks in Connal's stores were 128,262 tons at the close of last week, against 129,859 tons one week previous.

Difficulties of operating increase daily, railroad traffic being subject to interminable delays which are preventing raw materials from entering and finished goods from leaving works. To a large extent railroads are given up to government business. The Broken Hill Proprietary Company, Ltd., has booked 12,500 tons of rails for the Austrian commonwealth. Semi-finished steel is strong but not much business is possible in American steel owing to high freights. Quotations are as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 16s. 9d. ($4.07).

Cleveland pig-iron warrants, 67s. to 68s. ($16.30 to $16.55), compared with 63s. ½d. ($15.34) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 67s. ($16.30), against 63s. ($15.33) a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £10 10s. ($51.09).

Steel ship plates, Scotch, delivered local yards, £9 10s. ($46.22).

Steel rails, export, f.o.b. works port, £7 5s. ($35.28).

Hematite pig iron, f.o.b. Tees, 100s. ($24.33), against 95s. ($23.12) last week.

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 ($34.06).

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £9 ($43.79).

Steel bars, export, f.o.b. Clyde, £9 10s. ($46.22).

Ferromanganese, f.o.b., £15 10s. ($75.42).

Sharp Advance in Raw Materials—Shipbuilding Unprecedented—Labor Problem Vexing

(*By Mail*)

LONDON, ENGLAND, March 18, 1915.—There has been a rather dramatic alteration in the position of pig iron. For some little time the tendency of the warrant iron market in Glasgow has been slightly upwards, based naturally enough upon the extraordinarily strong fuel position and the advancing course of wages; but early this week there was a sharp jump, on reports that a number of furnaces contemplated closing down, and the markets have advanced further by leaps and bounds. The lot of the pig-iron maker is anything but a happy one. Prices of coal and ore are reaching a prohibitive figure and growing difficulty is experienced in maintaining production both at the pits and furnaces. There is appalling congestion on the railroads, and altogether things are very much at sixes and sevens, for frequently and without notice public traffic is refused, all facilities being reserved for the State. Speculative enterprise has been well to the fore and is largely responsible for the sharp advance in Cleveland pig iron, but apart altogether from that the limited output is going well into consumption and stocks remain very moderate. It is regarded as a very healthy feature that the price of distant deliveries should command a premium, but for all this there is very little disposition to contract.

RUBIO IRON ORE DIFFICULT TO OBTAIN

It is difficult to secure rubio ore and prices are almost prohibitive owing to excessive freights. The furnace owners are in a quandary, being unable to obtain ore at contract prices, and being unable to prevail upon steel makers, except in a few cases, to meet a portion of the enhanced cost of production. It is difficult to quote prices under the circumstances, but East Coast mixed numbers are today in the neighborhood of 95s. ($23.12). The ore market is exceedingly stiff on the basis of about 29s. 6d. ($7.18) exship Tees for 50 per cent. rubio ore, while freights are as difficult as ever to arrange. The coal position is worse than ever. The men will not work and even so demand 20 per cent. advance in wages.

As regards semi-finished steel the tendency is exceedingly firm, and but little foreign material is available. Within the last few days American sheet bars and steel billets have sold at 125s. ($30.42) c.i.f. Liverpool, but it is doubtful whether any further purchases could be made at this price, for sellers are asking 130s. ($31.63) while where business is contemplated c.i.f. Glasgow, Manchester or South Wales 130 to 135s. ($31.63 to $32.85) is named. Of course, if it were possible to arrange freight from America on anything like reasonable terms there would be business passing in tens of thousands of tons, but as it is the position is one of the utmost stringency, and is likely to remain so until reasonable shipping facilities are again in evidence. The Welsh steel makers have put up their prices and £6 15s. to £7 ($32.85 to $34.06) delivered locally are about the limits between which business is being done. There is no pressure to sell even at the higher figure, for the colliery owners and their men have between them pushed up coal to an absolutely prohibitive figure.

In finished steel there is an exceedingly strong tone, and the trouble is to induce the British workingman to work more than a couple of days a week. This is the case all over the country. The scarcity of labor and the terrific demand for steel and engineering material of all kinds has put the British workingman in a position where he can demand his own terms, and many of these men are to-day commanding £2 to £3 ($9.73 to $14.60) a day.

SHIPBUILDING ACTIVITY UNPRECEDENTED

There is unprecedented activity at the shipbuilding yards in connection with the hastening forward of Government contracts and a surprising amount of building is on the stocks. There is a considerable demand also in connection with ordinary freight and

passenger steamers, building being stimulated by the fabulous earnings of ships, and by the destruction of vessels which has been going on during the past two or three months. Ship plates are strong and works find it most difficult to give the deliveries required. There is a good demand for boiler plate as well and plants are being taxed to the utmost limit of their capacity. There is not much new business moving as regards steel rails, but within the last few days a big South African inquiry has been put forward, and strong hopes are entertained that the next few months may witness a release of very large business for Russia.

It is currently reported that the Russian Government has permitted the private railroads in the country to procure their supply of rails and accessories from abroad, duty free, in view of the fact that the whole of the Russian steel works are engaged continuously on State orders, and are, therefore, unable to consider any business for private individuals. This might easily prove to be an important factor in the British steel trade which already finds itself in a most difficult position owing to the scarcity and reluctance of labor, together with the resultant higher cost of raw material.

German Markets High

Lack of Skilled Labor Retards Output — Prices Rising—Ore Demand Heavy

BERLIN, March 8, 1915.

The war's effect upon the German iron trade is now less marked than at first. Workingmen were called into service in large numbers, and this is still going on; hence elderly workmen and to some extent unskilled labor have had to be taken on to do the work of the men called out. Neutral countries are bidding actively for German iron and steel, the English, French and Belgian makers having fallen out of competition in such countries as Switzerland, Holland and the Scandinavian states.

PIG IRON SCARCE AND HIGHER

Blast furnaces are very busy and are hardly able to make delivery on time. Furnaces that had been blown out when the war began have gradually been blown in again and this has been going on till within quite recent dates. There had been a complete suspension of production in Luxemburg and Lorraine in August and September, when the thunder of the cannon was still heard there; but production in that district has been resumed on a considerable scale. One of the chief uses of pig iron now is in producing shells, the demand for which is very great, inasmuch as artillery is playing a prodigious role with the German armies; and the foundries that cast them can hardly get enough iron. The tendency of prices is upward. The Syndicate about 10 days ago raised them for the second quarter 7 marks ($1.66) a ton, and in the Luxemburg district the same advance has been made—3m. (71c.) in January and 4m. (95c.) in February. The shipments of the syndicate in January reached nearly 62 per cent. of allotments, which means only about 10 per cent. below the rate that prevailed before the war began. Shipments in the Luxemburg-Lorraine district have now risen to 40 per cent. of allotments, which is the figure that was in force in July. There is also a heavy demand for waste and scraps, and prices have been tending sharply upward. The rise since the beginning of the year for the better qualities has been as much as 15m. ($3.57). Material is scarce, and there is a tendency to hold back supplies in expectation of still higher prices. The latest quoted pig-iron prices are as follows: Hematite, 95m. ($22.61.); foundry No. 2, 81.5m. ($19.39); No. 3, 76.5m. ($18.20); puddling, 73m. ($17.37); spiegeleisen, 86m. ($20.46).

HEAVY DEMAND FOR ORE

The demand for ores is remarkably active, due largely to the fact that nearly all foreign supplies except those from Sweden have been cut off by the war. High grade ores carrying manganese are especially wanted, and the Siegerland producers are turning them out at their utmost capacity. It is expected that the association will make a further advance of 1 to 1.5m. (23c. to 35c.) a ton this month. The minette ores of Luxemburg and Lorraine are also in heavy demand. Production across the frontier in the French Briey district, where the great German companies own large interests, has been resumed on a considerable scale under German auspices. The following prices are mentioned: Sparry iron ore, 12.8m. ($3.04); the same roasted, 19.5m. ($4.40); Nassau brown, 17m. ($4.04); minettes, 3.3m. (78c.) at mine.

The situation in semi-finished steel is strong. The works are making shipment as fast as they can turn out the material, and there is no accumulation of supplies anywhere. Production, on a reduced basis, is increasing, having reached 52,000 tons in January. The demand for steel from neutral countries is growing and home consumers are buying very actively. Structural shapes are in somewhat better demand, but the volume of business is still much restricted.

Bars are very strong and prices have been lifted rapidly under the influence of a price arrangement entered into by the mills several weeks ago. They had risen sharply just after the war began, and some selling as high as 115m. ($27.36) was reported, as against 92m. to 96m. ($21.89 to $22.84) previously; but the higher level was not fully maintained, and the general range in October was 100m. to 102m. ($23.79 to $24.26). Since then, however, a big advance has occurred, and the new agreement of the mills made 125m. ($29.74) the minimum for ordinary bars of basic steel. It is reported that Krupp is now demanding 128m. ($30.45) and another big concern 130m. ($30.93). Foreign countries are paying nearly or quite as high as the home trade; several days ago it was reported that Italy was paying 125m. ($29.74) in Lorraine. The foreign demand has improved.

ALL PLATES IN STRONG DEMAND

Plates of all grades have followed the upward movement. The war has created a big demand for them in making protecting shields for cannon and for riflemen firing from the trenches. Big shields of sheet-iron are also carried in front of the troops in storming hostile trenches. Thin sheets are also now used for many manufacturing purposes which had usually been met with brass and copper. There is also a good foreign demand for heavy and light plates.

The government has introduced special regulations for the export of plates and some other goods to neutral countries in all cases where it is feared that they might find their way into England and other countries with which Germany is at war. It requires a certificate from a German consul accompanying each order guaranteeing that the buyer is a manufacturer and needs the goods for his own purposes and that the product will not be exported. Thin plates have recently been marked up 10m. ($2.38) and heavy ones 5m. ($1.19). Heavy plates of ordinary qualities already cost as much as 140m. ($33.31), with still higher prices for better qualities. Thin plates cost 145m. to 150m. ($34.50 to $35.69). Boiler plates bring around 150m. ($35.69). The demand for ship plates is extraordinarily heavy; there is, in addition to the big domestic demand, heavy buying for Italy, Holland and Scandinavian countries, which are unable now to obtain goods from England.

Tin-plate mills are working under great pressure, there being a heavy home demand from manufacturers of cans, whereas imports from England, usually considerably greater than the home production, have been wholly cut off. The trade combination in these goods was dissolved last fall, but that has had no bad effect upon the market position.

The hoop-iron mills have work ahead for several weeks. Production, however, is considerably less than in peace times owing to the fact that many skilled laborers are now in the war. The bottom price for hoops and strips of soft steel is 140m. ($33.31); of course it is much higher for cold-rolled goods. The wire trade is extremely active owing to the heavy

demand from the armies for barb wire; but here, too, production is hindered through the lack of skilled workmen. Wire stock, which had dropped to 100m. ($23.79) before the war, has latterly been advanced to 120m. ($28.55), while drawn wire is quoted at 142.5m. to 145m. ($33.90 to $34.50). Wire nails stand at 155m. (36.88). Galvanized wire commands 180m. ($42.83), and barb wire of this material 230m. ($54.72).

A price convention in tubing was recently effected and prices have been advanced, ordinary gas and boiler piping by 10m. to 20m. ($2.38 to $4.76), but some grades of goods by as much as 50m. ($11.90). New buying, however, has fallen off to a marked extent since the higher prices went into effect.

Production of rails for domestic roads keeps up pretty well, January shipments having reached 152,000 tons, as compared with 168,000 tons in December. Locomotive shops are well employed upon government orders, but they feel the lack of the many skilled workmen called to the colors.

The following table gives a comparative view of prices before the war and now, though present prices are in some cases rather higher than those quoted here:

	Before the war, marks		Now, marks	
Siegerland ores (roasted)	18.5	($4.40)	19.5	($4.64)
Nassau brown ores	14.0	($3.33)	16.5	($3.92)
Hematite pig iron	79.5	($18.92)	101.5	($24.14)
Foundry No. 3	71.5	($17.02)	93.5	($22.25)
Blooms	82.5	($19.63)	97.5	($23.20)
Billets	95.0	($22.61)	110.0	($26.16)
Structural shapes	110.0	($26.16)	120.0	($28.55)
Bars of soft steel	95.0	($22.61)	125.0	($29.74)
Bands	115.0	($27.36)	140.0	($33.31)
Heavy plates	100.0	($23.79)	130.0 to 140.0	($30.93 to $33.31)
Thin plates	117.5	($27.95)	145.0	($34.50)

The Laurahuette, one of the best of the Silesian iron works, had earnings of only 2,023,000m. during the last half of 1914, compared with 5,815,000m. for the same period of 1913.

Metal Market

NEW YORK, March 31, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Mar.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
24	16.50	15.37½	49.25	4.15	4.12½	9.50	9.25
25	16.75	15.37½	46.00	4.15	4.12½	9.25	9.00
26	16.87½	15.62½	47.00	4.15	4.12½	9.25	9.00
27	16.87½	15.62½	.....	4.15	4.12½	9.25	9.00
29	16.87½	15.62½	53.00	4.15	4.12½	9.50	9.25
30	17.00	15.62½	52.00	4.15	4.12½	9.50	9.25

The good demand has caused copper to advance. Tin is higher in a quiet market. Lead is stronger as a result of heavy exports. Spelter is easier. English brands of antimony are no more plentiful and the market is unchanged.

New York

Copper.—The market shows continued and almost unusual strength. Figures as to the amount of metal taken are not available, but there has been heavy, if somewhat irregular, buying with the bulk of the sales on account of Europe. Exports of the month up to to-day total 28,679 tons, which is the heaviest of any month since July, 1914, despite the fact that the month's total is not yet complete. The trade is encouraged by a better domestic demand for electrolytic. Casting copper is very dull, which is to be expected in view of the fact that it does not share the war demand. Lake was quoted yesterday at 17c., cash, and electrolytic at 15.62½. The relatively heavier demand for Lake accounts for the unusually wide difference between its price and that of electrolytic. Several instances have come to light where efforts have been made to buy copper for Germany or Austria for delivery after the war, but so far as is known sellers have declined to enter such contracts, although immediate cash payment has been offered. Makers of hot rolled sheet copper have advanced their base price to 20.75c.

Tin.—The market has been quiet and with practically no buying of spot metal except by those compelled to purchase. As for future deliveries there is a lack of faith which has suppressed activity. On March 24 there were light sales at prices ranging from 49c. to 49.50c.; March 25, the market was nominal at 46c.; March 26, there were sales in the morning at 46c. and 46.25c. and the market closed strong, but dull, at 48c. On this day about 100 tons in small lots changed hands, making the day by far the best one of the week. Monday and yesterday the market was entirely nominal. Yesterday's quotation was 52c. The situation may be judged from the fact that offerings or purchases of only five tons were sufficient to affect prices several cents per pound one way or the other. March deliveries into consumption totaled 3200 tons, of which 900 tons came from Pacific ports. In stock at the present time are only 905 tons. The situation with regard to small stocks is promised relief in April. The steamer Philadelphian is due to arrive April 7 with 285 tons and several hundred tons are on the way direct from the Far East. The steamer Shimosa, with 550 tons from Singapore, has twice been obliged to stop on account of leaky boilers. Further relief will come from a considerable quantity of Banca tin which will come here direct. The total quantity now afloat is estimated at 3155 tons. The arrivals in March total but 1005 tons. This month 46 tons has been exported to Argentina.

Lead.—The heavy exports, which up to yesterday totaled 4240 tons for this month, caused the leading interest to advance its price $1 per ton March 23, making the New York quotation 4.15c. per lb. The quotation of independents at St. Louis is 4.12½c. Exports are still restricted by the lack of cargo space, but in many cases European buyers are assuming the risks of delivery. The London market continues strong.

Spelter.—An easier feeling has been brought about by the sales recently made on the floor of the New York Metal Exchange. The last of these occurred March 24, when 25 tons for May delivery was sold at 8c. and 75 tons for delivery in the same month at 7.75c. Prompt shipments from the West range about 9.50c., New York, and 9.25c., St. Louis, for prime Western, although these figures are more or less unsettled because of the falling off in demand. It is reported that some galvanizers have partially suspended operations rather than pay the high prices recently quoted. Brass mill special is quoted at 12c. to 15c. and some very choice grades, such as Bertha and Horsehead, are quoted around 16c. The exports this month total 5782 tons. Exports in March, 1914, were but 130 tons.

Antimony.—Hallett's antimony is declared to be practically unobtainable at its nominal quotation of 29c. Where a few cases of Cookson's can be found it brings 30c. Chinese and miscellaneous grades bring 22c. The market is dull.

Old Metals.—The demand continues strong. Dealers' selling quotations, which are unchanged, are as follows:

	Cents per lb.
Copper, heavy and crucible	14.00 to 14.25
Copper, heavy and wire	13.75 to 14.00
Copper, light and bottoms	12.50 to 12.75
Brass, heavy	9.50 to 9.75
Brass, light	7.75 to 8.00
Heavy machine composition	11.50 to 11.75
Clean brass turnings	9.50 to 9.75
Composition turnings	9.75 to 10.25
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	6.50

At the annual meeting of the New York Metal Exchange, March 29, officers were elected as follows: President, A. B. Hall, National Lead Company; vice-president, Edwin Groves, James W. Phyfe & Co.; treasurer, Charles S. Trench, C. S. Trench & Co. Board of managers—H. W. Hendricks, Hendricks Bros., Inc.; Emil Baerwald; W. Parsons Todd, Quincy Mining Company; Erich Benjamin; L. Vogelstein, L. Vogelstein & Co.; Julius Loeb, American Metal Company, Ltd.; E. W. Starke, Caswell & Starke, Inc.; Tobias Wolfson, United Metals Selling Company.

Chicago

MARCH 29.—The copper market continues to manifest decided firmness, and quotations are higher with an unusually wide spread in prices for Lake brands. Tin has fluctuated so rapidly as to create some uncertainty as to exact quotations; as low as 46c. has been named during the week, but the current market appears to be back again at 55c. Spelter in large quantities has sold in this market, for April delivery, as low as 8.50c., but for spot shipment, in small lots, prices continue nominally about the same as last week: We quote as follows: Casting copper, 15.25c. to 15.50c.; Lake copper, 15.87½c. to 16.50c., for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 55c.; small lots, 57c.; lead, desilverized, 4.15c., and corroding, 4.40c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, nominally, 9.75c.; sheet zinc, 13.50c., price for immediate acceptance; Cookson's antimony, 30c., for cask lots; other grades, 23c. to 24c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12.25c.; copper bottoms, 10.75c.; copper clips, 12c.; red brass, 10.75c.; yellow brass, 8.75c.; lead pipe, 3.50c.; zinc, 7.25c.; pewter, No. 1, 25c.; tinfoil, 35c.; block tin pipe, 39c.

St. Louis

MARCH 29.—Erratic conditions continue in the market for non-ferrous metals, but in the main prices are higher except for spelter. Lead is quoted at 4.20c.; spelter, 9c. to 9.50c.; tin, 52c.; Lake copper, 15.62½c. to 15.97½c.; electrolyte copper, 15.50c. to 15.85c.; Cookson's antimony, 25c. In the Joplin ore market zinc blende was easier at $55 to $63 per ton, with the best settlement at $66. Calamine was quiet at $35 to $40, with the best settlement at about $47. Lead ore was firm at $50. Miscellaneous scrap metals are quoted as follows: Light brass, 6c.; heavy yellow brass, 7.50c.; heavy red brass and light copper, 9.50c.; heavy copper and copper wire, 11c.; zinc, 5.50c.; lead, 3.50c.; tea lead, 3.50c.; pewter, 23c.; tin foil, 28c.

Iron and Industrial Stocks

NEW YORK, March 31, 1915.

Buoyant conditions have continued in the stock market and sharp advances have been made in the prices of numerous securities. The most spectacular performance has been that of Bethlehem common, which advanced by leaps and bounds from day to day, stimulated by expectations of the announcement of record earnings in the past year, fully realized when the annual report of the company was made public on Saturday. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	9½ - 12	Nat. En. & St., com.	13¼ - 13⅝
Allis-Chal., pref..	37 - 45	Nat. En. & St., pref.	79⅞ - 80⅛
Am. Can, com...	29¼ - 32¼	Pressed Stl., com.	30 - 34½
Am. Can, pref...	94 - 95¾	Pressed Stl., pref.	87½ - 93
Am. Car & Fdy., com.	45 - 46¾	Ry. Spring, com.	22⅞ - 24¼
Am. Loco., com..	24¼ - 27¾	Republic, com...	21 - 23
Am. Loco., pref..	83½ - 85	Republic, pref...	77½ - 79¼
Am. Steel Fdries.	26 - 26⅞	Rumely Co., com.	⅞
Bald. Loco., com.	33 - 35	Sloss, com.	28 - 29
Bald. Loco., pref.	96 - 97	Pipe, pref.	34
Beth. Steel, com.	66⅝ - 91½	U. S. Steel, com.	47¾ - 49⅝
Beth. Steel, pref.	104½-105¾	U. S. Steel, pref..	105⅝-106¼
Colorado Fuel...	26¾ - 28½	Va. I. C. & Coke.	40 - 44
General Electric.	141½-143	West'gh'se Elec..	72 - 73⅜
Gt. No. Ore Cert.	33⅜ - 35½	Am. Ship, pref.	70
Int. Harv. of N. J., com.	95¾ - 96	Chic., Pneu. Tool	48½ - 50
Int. Harv. of N. J., pref.	112	Cambria Steel...	42½ - 43¾
Int. Harv. Corp., com.	72 - 73	Lake Sup. Corp..	6¼ - 7⅛
Int. Harv. Corp., pref.	100	Warwick	9½
Int. Pump, pref.	6¼	Cruc. Steel, com.	13½ - 14
Lackawanna St'l	30 - 33	Cruc. Steel, pref.	77 - 77¾
		Harb. Wk. Ref., pref.	98 - 99
		La Belle Iron, com.	28½ - 29

Dividends

The Westinghouse Electric & Mfg. Company, regular quarterly, 1¾ per cent. on preferred and 1 per cent. on the common stock, the preferred payable April 15, and the common April 30.

The American Locomotive Company, regular quarterly, 1¾ per cent. on the preferred stock, payable April 21.

The American La France Fire Engine Company, Inc., 1 per cent. on the common stock, payable May 15, and 1¾ per cent. on the preferred stock, payable April 1.

The American Screw Company, quarterly, 1½ per cent., payable March 31.

The Union Switch & Signal Company, regular quarterly, 1½ per cent. on both the common and preferred stock, payable April 15.

The Westinghouse Air Brake Company, regular quarterly, $2 a share, payable April 15.

The Pittsburgh Coal Company, regular quarterly, 1¼ per cent. on the preferred stock, payable April 26.

The Wheeling Steel & Iron Company, 1 per cent. on the common stock, payable April 30.

The National Fireproofing Company has deferred its quarterly dividend of 1 per cent.

Accept Sheet and Tin Mill Wage Reduction

The third referendum vote among sheet and tin mill workers in sheet and tin-plate mills that sign the Amalgamated scale was taken last Saturday, and was favorable to a reduction being accepted of 11.2 per cent. in sheet mill wages and about 6 per cent. in tin mill. Lodges in the Youngstown district voted heavily in favor of the reduction, but in Wheeling and Follansbee, W. Va., the vote was adverse. The matter is now settled. The reductions become effective from March 22 and will continue in force until June 30, on which date the scale year expires. There is a precedent for this action of the Amalgamated Association in reducing wages before the end of a scale year; some years ago, after protracted sessions in Pittsburgh, the association made an average reduction of 18 per cent. in sheet and tin mill wages. It is expected that the Falcon and Empire mills of the Brier Hill Steel Company at Niles, Ohio, which have been idle pending settlement of the sheet scale, will start up this week.

To Manufacture Sheets in Canada

A new manufacturing venture, to be known as the Dominion Sheet Metal Company, Ltd., capitalized at $300,000, will locate at Hamilton, Canada. It will manufacture galvanized sheets, of which about 68,000 tons was used in Canada last year, all of which was imported. The bulk of the stock in the new company is held by Ohio and Indiana investors. The enterprise will be managed by A. T. Enlow, Oshawa, Ont., who before going to Oshawa two years ago was connected with the Stark Rolling Mill Company and the Berger Mfg. Company, Canton, Ohio. A site of 4½ acres has been purchased in the east end of Hamilton and work will be started at once on the buildings. The annual capacity at the start will be 15,000 tons.

Record Output of Radium and Uranium

The 1914 output of radium and uranium in the United States was the largest recorded, according to the United States Geological Survey. The production was about 4300 tons of ore carrying 87 tons of uranium oxide and 22.4 grams of metallic radium. Exports to Europe were a little over 1200 tons of ore containing 28.1 tons of uranium oxide and 7.2 grams of radium, but some of it was held in transit owing to the war.

For Tin-Plate Plants in Australia

Because Australia imported, in 1913, tin plates valued at £527,000, against imports valued at £207,000 in 1910, the Commonwealth's government is being urged to encourage the establishment of tin-plate plants in that country. It is pointed out that the trade is growing rapidly and that since both tin and iron are found in Australia, steps should be taken to avoid the neces-

sity of sending so much money out of the country to bring back Australian products in finished form. A bonus is suggested as in pig iron, etc. Tin ore and concentrates exported in 1913 were nearly 90,000 cwt., which largely went to Straits Settlements for treatment with cheap labor.

Matthew Addy Company Organized

The Matthew Addy Company, Cincinnati, O., has been incorporated with a nominal capital stock of $100,000. The new company succeeds the old partnership of Matthew Addy & Co. and will occupy the same suite of offices in the First National Bank Building. The officers are James A. Green, president; Benjamin N. Ford, vice-president; A. B. Champion, secretary, and R. M. Lambert, treasurer. These officers with W. W. Hearne, Philadelphia, constitute the board of directors. Employees of the old firm who will remain in charge of their different departments are E. A. Kebler, William S. Ranson, G. Delvin Orr, J. H. Becker and W. W. Fowler.

Speculative Pig-Iron Buying

Referring to the pig-iron market of the week ending March 27, the Matthew Addy Company says: "This week the distinguishing feature of the situation has been the activity of speculators. They have been figuring in nearly all sections on large purchases to be held against the day of higher prices. There is a story of an English syndicate that has negotiated for the purchase of 100,000 tons. The story came in an indirect way, but it is attended by fairly good circumstantial evidence. However, large blocks of speculative iron have been taken from the market."

The Pacific Coast Steel Company, Seattle, Wash., which recently purchased the plant of the bankrupt Irondale Steel Company, Irondale, Wash., announces through its manager, Thomas S. Clingan, that plans made at that time have been changed, and the company will erect a new and strictly modern open-hearth furnace plant, with one rolling mill and necessary buildings. The only part of the Irondale plant utilized will be the 22-in. rolling mill. The new plant will be electrically operated, and the open-hearth furnaces will have a total capacity of 200 tons of steel per day. The company also plans the ultimate construction of tinplate and sheet mills, a new field of industry on the Pacific coast.

The J. I. Case Threshing Machine Company's report for the year ended December 31, 1914, states that the gross sales increased practically $1,000,000 over the previous year, while the surplus for the year was $116,197 after the payment of the full preferred dividend. In 1913 a transfer was made from the surplus to a special inventory reserve of $1,000,000 and this has now been retransferred to the surplus, making the profit and loss surplus December 31, 1914, $2,973,172, against $1,856,975 at the close of the previous year.

The Moore Drop Forging Company, Springfield, Mass., has engaged space in the Palace of Varied Industries at the Panama-Pacific International Exposition, San Francisco, and has placed on exhibit a complete line of its different types of monkey, chain and pipe wrenches.

The ninth annual convention of the Illuminating Engineering Society will be held at the New Willard Hotel, Washington, D. C., September 20-23, inclusive. E. S. Marlow, Potomac Electric Power Company, Washington, D. C., is chairman of the convention committee. The programme has not yet been announced.

The Canadian Car & Foundry Company, Ltd., Montreal, Que., and Amherst, N. S., has received an order from the Russian Government for shrapnel shells at an estimated value of $80,000,000. Sub-contracts are to be let in the United States as well as in Canada.

New Freight Rule on Bulky Articles

WASHINGTON, D. C., March 30, 1915.—A new rule governing freight rates on shipments of bulky articles has been promulgated by the Interstate Commerce Commission. This follows an investigation begun on its own initiative, but in which intervention was permitted on the part of the Illinois Steel Company, Illinois Steel Warehouse Company, Joseph T. Ryerson & Son, Cambria Steel Company, Otis Steel Company, Carnegie Steel Company, American Bridge Company, American Rolling Mill Company and National Corrugated Culvert Mfg. Company. Whether the new rule will result in a net increase or decrease in rates can not be determined until it has been enforced for some time.

Under the regulations heretofore in force in official classification territory when less-than-carload shipments of articles are loaded on a flat or gondola car, on account of their being too bulky to be loaded in a box car through the side door thereof, they have been charged at actual weight and less-than-carload class rates for each article subject to a minimum charge at first-class rate on 5000 lb. In Southern classification territory a similar rule has been in force, but the minimum limit has been 4000 lb. and in Western classification territory a minimum of 5000 lb. has been combined with a specification that the increased rate shall apply to all articles "too large to be loaded through the side door of a 36-ft. box or stock car, or too long to be loaded through the end window thereof." Many complaints have arisen because of the variation of these rules and because of the different interpretations put upon them by the carriers, with the result that there is no uniformity in charge on like shipments.

The commission found upon investigation that the average size of car in the different classification territories varies. In Southern and official classification territories the average length of car is 36 ft., which is the length adopted by the American Railway Association, while in Western classification territory there are a majority of 40-ft. cars. In official classification territory only 2.3 per cent. of the box cars are equipped with end doors or windows, while in Southern classification almost all of the cars that are provided with end windows are ventilator cars and have screens or slats over these windows. In Western classification territory a great many of the cars are provided with end windows which are not screened. In the newer equipment, in which corrugated steel ends are being used, the end window is eliminated. Cars that are provided with end windows, unscreened, can be used for the loading of long freight by passing it through such windows, by which means articles as long as the car itself may be loaded. The loading of extra long or extra bulky shipments has been found by the commission to entail much unusual handling and expense, especially when it is necessary to use an available end window. It also frequently happens that because of loading extra long articles on the floor of a car it is necessary to re-handle other freight before it can be unloaded.

The commission now lays down the following rule, which is to be enforced in all classifications:

> Unless otherwise provided, a shipment containing articles the dimensions of which do not permit loading through the center side doorway, 6 ft. wide by 7 ft. 6 in. high, without the use of end door or window in a closed car not more than 36 ft. in length by 8 ft. 6 in. wide and 8 ft. high, shall be charged at actual weight and authorized rating, subject to a minimum charge of 4000 lb. at the first-class rate for the entire shipment.

The chief object of this rule is to provide a harmonious procedure for all territories without materially raising or lowering rates. There is no claim on the part of the carriers in this investigation that the traffic as carried under the present rules is not remunerative and the commission holds that the minimum weight applicable under the minimum charge should be lower to compensate for the additional revenue which will result to the carriers from the operation of the proposed rule. In spite of the fact that the size of the equipment in Western classification territory is somewhat larger than in other territories, the commission regards it as highly desirable that the rule should be uniformly stated.

W. L. C.

Pittsburgh and Nearby Districts

The Ingram-Richardson Mfg. Company, Beaver Falls, Pa., is installing a coal-handling plant, comprising concrete storage bins and a monorail crane system to carry coal from those bins to other bins directly above the furnaces. The crane runway will be built to the ash dump, and the same crane will be used to deposit the ashes, using a special ash dumping bucket. The contract for the crane and runway has been given to the Alliance Structural Company, Alliance, Ohio. A waste-heat boiler, not yet bought, will be installed at a later date. The company, which manufactures porcelain enameled iron signs, is also erecting a new pressed steel department, now nearly completed, and for which the mechanical equipment has all been bought, with the exception of the machine-shop tools, still to be purchased. The company has found some improvement in the volume of its business since the first of the year, but its products are being sold at the lowest prices in its history.

The Youngstown Iron & Steel Company, Youngstown, Ohio, will install in its new open-hearth plant universal plate and skelp mills. The universal mill will roll plates up to 36 in. wide and 120 ft. long, from 3/16 in. to 1 in. in thickness, while the skelp mill will roll 8 in. to 16 in. wide, 3/16 in. thick and upward.

The Dale Light, Heat & Power Company, Johnstown, Pa., is having plans made for the erection of a power plant and will buy a large amount of equipment, including turbines. Stone & Webster, engineers, 5 Nassau street, New York City, are preparing the plans.

The report that the Youngstown Sheet & Tube Company, Youngstown, Ohio, will build a second double-rod mill at Struthers, Ohio, is incorrect. The only addition to its works thus far decided upon by this company is the by-product coke oven plant, for which the type of oven has not yet been fixed. The company has plans for a number of new mills for different lines of products, on which definite decision may shortly be reached.

The Thomas Carlin's Sons Company, North Side, Pittsburgh, recently shipped two 8-ft. wet pans, arranged for motor drive, and one 20 x 12 in. Blake type crusher to the Bethlehem Steel Company, South Bethlehem, Pa.; a No. 18 belt-drive shear to the Bryden Horse Shoe Company, Catasauqua, Pa.; one to the Detroit Brass & Copper Rolling Mills Company, Detroit, Mich., and a No. 40 shear to the Susquehanna Mills, Columbia, Pa. It is building one 9-ft. dry pan for the American Iron & Steel Mfg. Company, Lebanon, Pa.; one 8-ft. wet pan, and a 9 x 15 in. Blake type crusher for the Youngstown Iron & Steel Company, Youngstown, Ohio, and one 5-ft. self-discharging wet pan for the Detroit Copper & Brass Rolling Mills Company, Detroit, Mich. It is also building two lock gate winches for the United States Engineer's office, Pittsburgh, with two 10 x 12-in. double engines for operating them.

The Diamond Forging & Mfg. Company is now occupying its new forging plant, North Side, Pittsburgh, and is operating it day and night. Its electro-galvanizing, nickel and brass plating department is also in full operation day and night. The installation of this plant has been of great convenience to local interests that have heretofore had such work done elsewhere. A demand has also been found outside of Pittsburgh, among those who had been buying their raw material in that city, shipping it to some other place to have it plated and then reshipping it to the buyer. The company will shortly start work on a heat-treating department, which will be modern in every way. If the heavy demand continues the company will probably make additions to its plant in the near future. Contracts now on the books will keep the factory operating day and night for the next three months.

The Economy Valve Mfg. Company, Duquesne, Pa., has been granted a charter with a capital of $5000. It is about to put on the market a new form of valve. A small plant will probably be erected in Duquesne, which is near Pittsburgh.

The Pittsburgh Annealing Box Company, Pittsburgh, has been incorporated with a nominal capital of $5000 soon to be increased to $100,000. It will take over the business of the National Mfg. Company, North Side, Pittsburgh, manufacturer of annealing boxes, galvanizing pots and plate work. A contract has just been received from the McKeesport Tin Plate Company, McKeesport, Pa., for all the annealing boxes and annealing box bottoms that will be needed this year in the new 20 hot tin mills being erected by that company. A contract had previously been secured for all the annealing boxes and annealing box bottoms needed this year for the present 22 hot tin mills of the company.

The H. Koppers Company, First National Bank Building, Pittsburgh, has closed a contract with the Republic Iron & Steel Company for the erection of 75 more by-product coke ovens, which will be added to the present plant of 68 Koppers ovens at Haselton, Ohio, work to be started at once.

The Cambria Steel Company, Johnstown, Pa., has started work on another benzol plant. It will have a capacity of about 3000 gal. every 24 hours. The present benzol plant at Johnstown, built by Thomas A. Edison, takes care of the output of benzol of one-third of the present 450 ovens and the new plant will take care of the other 300 ovens. The Cambria Company is installing a new continuous heating furnace in its rail mill, two in the 22-in. structural mill and one in the 13-in. structural mill. All these heating furnaces will be of the Slick type.

The Charles T. Topping Machinery Company, Pittsburgh, Pa., has removed its offices to suite 928, Oliver Building. It will continue as direct representative in western Pennsylvania and northern West Virginia for Koehring concrete mixers, Clyde hoisting engines and derricks, Wylie concrete distributing systems, the Cement-Gun, McKiernan-Terry pile hammers and rock drills and other lines of contractors' and mine equipment.

The Manati Sugar Company, Province of Oriente, Cuba, with offices in New York City, has placed an order with the Westinghouse Electric & Mfg. Company, East Pittsburgh, for electric motors to drive all of the machinery in its new mill with the exception of the engine-driven rolls. This order covers a total of 32 alternating current motors, having a total capacity of 1042 hp.

The Warner & Swasey Company, Cleveland, Ohio, has taken a contract for the construction of a 60-in. reflecting telescope for the National Observatory, Cordoba, Argentina. While this telescope is not so large as the one for which the company received an order from the Canadian Government a few months ago, it will rank among the largest telescopes in the world. The mirror will be 8 in. thick and will weigh one ton. The tube will be 27 ft. long, 6 ft. in diameter and with its accessories will weigh more than 14 tons. It is stated that the only telescope in the United States that matches this in size is a 60-in. reflecting telescope at Mt. Wilson, California.

A special commission from Spain was last week the guest of the Commercial Museum of Philadelphia. It is composed of Jose de Gorostizaga, special commercial delegate; Enrique Goded, mining engineer; Ramon B. Burillo, irrigation expert; Mariano F. Toral, railroad expert; Antonia Artiles and Jose Gonzales. It will investigate the possibility of replacing former imports from Germany with American goods. A favorable report to the Spanish Government will be followed by the appointment of a permanent commission.

The Emerson-Brantingham Company, manufacturer of agricultural implements, reports for the fiscal year ended October 31, 1914, a deficit of $474,741 after the payment of three of the regular quarterly dividends on the preferred stock. This compares with a surplus of $453,174 for the 15 months ended October 31, 1913, in which period the full dividend was paid on the preferred stock. The balance sheet as of October 31, 1914, shows a deficit in the surplus of $474,741, against a surplus on the corresponding date in 1913 of $453,174.

Westinghouse Electric Expands at Cleveland

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., will enlarge and remodel its plant at Cleveland, Ohio, and will dismantle its plant at Allegheny, Pa., and remove its equipment to Cleveland. Bids have been taken for an eight-story pattern building 200 x 700 ft. The upper story and basement will be used for manufacturing purposes and the remainder of the building for pattern storage. Three or four of the old cupolas in the Cleveland plant will be scrapped and replaced with three new ones. There also will be installed a continuous molding unit, with conveyors, etc., new cleaning room equipment, and some new molding machines. It is the intention to make the Cleveland plant a light-work unit, although some heavy work will still be done in this foundry. The remainder of the heavy work will be transferred to the company's plant at Trafford City, Pa. B. D. Fuller will continue as foundry superintendent, and Charles F. Knowlson, who has been superintendent of the Allegheny plant, will go to Cleveland as his assistant. Plans for the pattern warehouse have been prepared by Prack & Perrine, architects, Pittsburgh. It will be a brick and concrete building.

Felt Comptometer Patents Sustained

The Felt & Tarrant Mfg. Company, 1713-1735 North Paulina street, Chicago, won an important suit involving adding and calculating machine patents March 25, when a decision was rendered by the United States District Court at Chicago for infringement of the Felt comptometer patents by the Burroughs calculating machine, made by the Burroughs Adding Machine Company. This suit has been pending for several years and charged infringement of 58 claims in 4 patents. The court, after having held the case for consideration for several months, broadly sustained all claims and decided the whole matter in three words: "Decree for complainant." The defendant took the usual appeal, making the usual motion, that the decree be suspended through the appeal, but the court allowed the suspension only on the condition that the appeal be prepared for hearing during the spring term of the Court of Appeals. This assures an early decision on appeal.

The Association of Edison Purchasing Agents elected the following officers at its recent annual meeting in Buffalo, N. Y.: President, W. H. Francis, Edison Electric Illuminating Company, Buffalo; first vice-president, Andrew Banks, Consolidated Gas, Electric Light & Power Company, Baltimore; second vice-president, J. W. Brennan, Edison Illuminating Company, Detroit; treasurer, D. R. Blaicher, Minneapolis General Electric Company, Minneapolis; secretary, H. F. Frasse, Edison Electric Illuminating Company, 360 Pearl street, Brooklyn, N. Y.

In the fire at the plant of the Burden Iron Company at Troy, N. Y., on the night of March 18, which partly destroyed the puddling forge building, one-third of the roof, which was of wood, was entirely burned. The rest of the building, which has a steel roof, was saved. The operation of eleven double puddling furnaces is suspended until the roof can be replaced.

The American Rolling Mill Company, Middletown, Ohio, is operating in full this week its plants in that city, as well as its sheet mill at Zanesville, Ohio. The company has considerable orders from car works for forging steel, as well as a good tonnage of export business.

The Studebaker Corporation, South Bend, Ind., under its profit-sharing plan, has distributed $300,000 to heads of departments, superintendents and foremen at South Bend and Detroit.

After May 1, the address of the New York office of the Dorr Cyanide Machinery Company will be room 2843, Whitehall Building, instead of 30 Church street.

Michigan Wire-Fence Freights Reduced

WASHINGTON, D. C., March 30, 1915.—Manufacturers of wire fence located at Adrian and Tecumseh, Mich., have been granted reduced rates on wire transported from Pittsburgh and on wire fence shipped to Chicago as the result of a proceeding which has been pending before the Interstate Commerce Commission for more than two years. The principal contention in the complaint was that in making up their tariffs the railroads placed Adrian in the Detroit grouping instead of giving it the Toledo rate. From Pittsburgh to Toledo the current rate is 13.7c. per 100 lb., while to Detroit the rate is 15.8c. From Pittsburgh to Chicago the combination of the rates to and from Adrian now exceeds the joint through rate by 10.6c. The complainants have conducted their business under relatively similar rates for many years, but recently competition from manufacturers making fence in the Pittsburgh district has greatly reduced their profits and made it necessary to consider carefully every possible economy. Adrian is served by the Wabash, the Lake Shore & Michigan Southern and the Baltimore & Ohio railroads, all of which admitted the disadvantages under which the Adrian manufacturers of fence labored, but justified their refusal to grant relief by stating that it would seriously disrupt the central freight associate rate adjustment. Upon consideration of all the facts in the record, however, the commission finds that the present grouping of Adrian is unreasonable and decides that for the future the rate on wire from Pittsburgh to Adrian should not exceed the rate to Toledo by more than 1c. per 100 lb., to be maintained for a period of not less than two years.

The commission has refused to grant the relief asked for in the complaint of the Delphos Mfg. Company, engaged in galvanizing sheet iron at Delphos, Ohio, which alleges that the local rates on black sheets from Pittsburgh to Delphos and on galvanized sheets from Delphos to Chicago are unreasonable. In considering this case the commission has reached the conclusion that the disadvantage under which the complainant is laboring is not due entirely to the freight rate adjustment but partly to commercial conditions. W. L. C.

Cincinnati Sheet Metal Contractors' Banquet

The Master Sheet Metal Contractors' Association, Cincinnati, Ohio, gave a banquet at the Hotel Gibson, in that city, on the evening of March 24. Nearly 100 were present, the occasion being the celebration of the tenth anniversary of the National Sheet Metal Contractors' Association. The speakers were introduced by F. William Stechow, president of the Cincinnati Association. The general theme was closer co-operation by the manufacturer, jobber and contractor, with the view of improving the quality of materials used and the workmanship on all jobs undertaken. G. F. Ahlbrandt, assistant manager of sales of the American Rolling Mill Company, Middletown, Ohio, who was among the speakers, assured the members of the association of the hearty co-operation of his company in their efforts to uplift the trade.

The Cincinnati association is arranging to send a large delegation to the meeting of the Ohio Sheet Metal Contractors' Association, to be held in Dayton June 3.

The Chain Belt Company, Milwaukee, Wis., has established an office in Minneapolis, Minn., at 320 Temple Court, in charge of W. H. Ziegler. The office is opened primarily to promote the sale of Rex concrete mixers. Mr. Ziegler also represents Marion steam shovels, Acme rock crushers, Wyoming shovels and Industrial Works locomotive cranes and clam-shell buckets.

At the annual stockholders' meeting of the Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, held last week, the following officers were elected: President, James Kilbourne; first vice-president, F. A. Jacobs; second vice-president and general manager, J. R. Kilbourne; treasurer, F. C. Eaton; auditor, J. D. Potter; assistant secretary, C. E. Roth.

PERSONAL.

John C. Jay, Jr., general manager of sales of the Pennsylvania Steel Company, was elected vice-president of the company at a meeting of the directors in Philadelphia last week. Mr. Jay entered the works of the Pennsylvania Steel Company at Steelton, Pa., in 1901 as an apprentice and his advancement has been rapid

JOHN C. JAY, JR.

and well-earned. In 1902 he was transferred to the New York sales office and he was appointed the manager of that office in May, 1906. In July, 1912, he was made general manager of sales, with offices at Philadelphia.

Before the Chicago Association of Commerce, on March 26, O. J. Abell, Western editor of *The Iron Age*, gave a lecture on the steel industry of the Chicago district, illustrated with lantern slides. It began with views of prospecting drills on the iron ranges and following the various stages of ore mining, transportation and unloading, took up the manufacture of pig iron and its conversion into steel shapes. From a commercial standpoint, the lecture was of special interest to the business men present for the reasons given by Mr. Abell for the growth of steel manufacture at the foot of Lake Michigan, such as the cheapening of local coke costs by the by-product process and the accessibility of the furnaces and mills to direct vessel delivery of ore.

William Siebenmorgan has resigned as chief engineer of the C & C Electric & Mfg. Company, Garwood, N. J.

George R. Harper, Chicago, has been appointed superintendent of the Burlington Brass Works, Burlington, Wis., to succeed W. B. Crawford, who will return to the East and engage in similar work. Mr. Harper has been associated with the company for many years as a selling representative.

David Harlowe, whose term as member of the Wisconsin Railroad Commission expired February 1, intends to establish offices in Milwaukee as a consulting engineer, specializing in counsel on ocean shipments and insurance for manufacturers. Mr. Harlowe resigned as traffic manager of the former Allis-Chalmers Company to become a railroad commissioner.

A. L. Whittemore, formerly connected with J. H. Williams & Co., Brooklyn, N. Y., has established himself as a manufacturers' representative at 40 South Clinton street, Chicago, Ill. He represents the Vilchek Tool Company, Cleveland, Ohio, manufacturer of hardware, tools and automobile tool kits, and W. N. Best, New York, manufacturer of fuel oil burners and furnaces. Mr. Whittemore also represents the Grinden Art Metal Company, Brooklyn, N. Y.

Walter M. Wood, who has been with Manning, Maxwell & Moore, Inc., for about 15 years, has presented his resignation as manager of the company's Boston office because of ill health. J. S. Wainwright, formerly of the Detroit branch of the company, will succeed Mr. Wood April 1.

E. A. Stillman, president Watson-Stillman Company, Aldene, N. J., sailed for Europe March 27. He will go to France on business, expecting to remain about five weeks.

Abbott A. Thayer, special representative of the Cincinnati Milling Machine Company and other Cincinnati companies, is in Europe on business connected with them. He will visit Russia.

Axel Bonthron, of the machine-tool house of Axel Ryden, Stockholm, Sweden, has returned to Europe after staying about two months in this country.

James R. Kelly, managing director of James R. Kelly & Co., Leeds, England, has opened an office at 59 Walker street, New York, where he may be addressed, in care of the Mann Lithopress Company.

Gustav Mattmann, of the Cincinnati Milling Machine Company, sailed for Europe March 25.

H. V. Lewis, formerly president of the H. V. Lewis Company, 30 Church street, New York, is now connected with the Allied Machinery Company of America. He will go abroad, although the time for his departure is not yet fixed.

Paul E. Thomas, general manager of the Kempsmith Mfg. Company, Milwaukee, Wis., manufacturer of milling machines, planned a series of meetings for the purpose of bringing heads of departments into closer touch with one another and to enable them to become familiar with advanced thought along lines of efficiency and co-operation. The first of the series was held on the evening of Tuesday, March 30, when about 25 members of the executive and clerical force were guests of the company at a dinner given at the Hotel Blatz. The principal speaker was A. F. Sheldon, Chicago, who talked on "Human Efficiency."

I. Cohade, chief metallurgical engineer of Schneider & Co., Creusot, France, is spending a short time in the United States looking after some orders for steel that are being placed by his company.

G. M. Haardt, director general of the Mors Automobile Company, Paris, France, has come to the United States to purchase equipment for making shrapnel shells.

G. Haven Peabody, Chicago, Western representative for the Lima Locomotive Corporation, will represent the Lackawanna Steel Company in the sale of the products of its new benzol plant, begininng May 1. He will be associated with the New York office of the company.

Col. H. P. Bope, vice-president and general manager of sales for the Carnegie Steel Company, Pittsburgh, made an address before the Youngstown Advertising Club, Youngstown, Ohio, last week on "Buying, Selling and Advertising."

G. Haven Peabody has resigned his position as Western representative of the Lima Locomotive Corporation, Lima, Ohio, to become connected with the Lackawanna Steel Company on April 15.

Frank N. Grigg has been designated sales agent for the Harlan & Hollingsworth Corporation, Wilmington, Del., with headquarters at 1201-2 Virginia Railway & Power Building, Richmond, Va.

Charles Warnock has been appointed manager and treasurer of Robert W. Hunt & Co., Ltd., Montreal, succeeding Charles C. Whittier, transferred to the Chicago office.

Daniel Runkle, who was connected with the Warren Foundry & Machine Company for 12 years, has been appointed New York representative of the Standard Cast Iron Pipe & Foundry Company, succeeding J. H.

Blanchard, resigned, to engage in another line of business. Mr. Runkle's offices are in suite 2510, 61 Broadway, New York.

Joseph A. Meyerovitch, managing director of the Allis-Chalmers Mfg. Company's Russian agency, with headquarters at Petrograd, visited the general offices in Milwaukee last week to close contracts for the equipment of a large cement works.

L. E. Kennedy has resigned as secretary, treasurer and general manager of the Western Brass Company, Milwaukee, and will engage in business at Burlington, Wis., his former home.

W. F. Davis, superintendent of the Bessemer department of the Cambria Steel Company, Johnstown, Pa., now has charge of both the Bessemer and open-hearth departments. C. A. Alexander, former head of the open-hearth department, is engaged in special work for the company

Magnesium Made Electrolytically

Metallic magnesium is to be manufactured electrolytically by the Aviation Materials Corporation, 99 Cedar street, New York, which has been incorporated under the laws of New York State. The plant will be located at Niagara Falls, N. Y., and it is expected it will be completed in June. It will operate under the patents of George O. Seward and F. von Kügelgen, who developed the process at the Virginia plant of the Virginia Electrolytic Company, Holcombs Rock, Va. The output is expected to be 10 tons of metallic magnesium per month. Besides being a constituent of some important alloys, magnesium is a beneficial addition to aluminum castings, as much as two per cent. often being used. An alloy containing 98 per cent. magnesium has been made by the inventors mentioned, which is lighter than aluminum and stronger. The average market price of metallic magnesium is $1.50 per lb.

Iron and Steel Section of Chicago Association of Commerce

The Iron and Steel subdivision of the Association of Commerce of Chicago announces that it will undertake this year a development of the common ground of interest already existing for its members, with a view to bringing about freer communication among the iron and steel interests in that district. In spite of the great diversity of product and the fact that plants are quite widely separated, there are common problems which furnish a basis for combined effort and plans are on foot for such co-operation. At a recent meeting of the subdivision O. J. Abell, of *The Iron Age*, was appointed chairman, and S. J. Llewellyn, president of the Interstate Iron & Steel Company, will continue to give his services as vice-chairman.

The many copper mines of Cyprus, now unworked but well known in historic times, are being explored by an American syndicate from Arizona with a view to active mining soon, according to Consul General W. S. Hollis, Beirut, Syria. Several mining men are expected in the near future from Arizona to form the staff at the works.

The Society of Mining Engineers of Santiago, Chile, is organizing a technical department for the purpose of assisting Chilean mining companies in the selection of machinery. It being a semi-official institution, it will probably attract a good many local miners, and American catalogues will be acceptable, but preferably in Spanish.

The Northern Chemical Engineering Laboratories, Madison, Wis., has changed its name to the C. F. Burgess Laboratories. No change has been made in the management or ownership, and the practice of chemical engineering, research and industrial development will be continued as heretofore.

OBITUARY

GEORGE MCINTYRE MARSHALL, Kilbourn City, Wis., died recently, aged 81 years. He was a native of Canada, and in 1879 established the Kilbourn Machine Company, which was taken over by his son in 1899. In late years he operated a small experimental shop. He is credited with designing the first practical steam road vehicle.

WILLIAM J. GREER, for some years Pittsburgh representative of the Van Dorn Electric Tool Company, was instantly killed March 28 in an automobile accident in Pittsburgh. He leaves his widow, a daughter and a son.

LOUIS A. SAYRE, of L. A. Sayre & Son, Newark, N. J., manufacturers of mechanics' tools and hardware specialties, died March 23.

Customs Decision, Unfinished Machinery Parts

WASHINGTON, D. C., March 30, 1915.—A comprehensive decision of importance to importers of machinery and other metal manufactures has been rendered by the United States Court of Customs Appeals, in which is laid down a rule of instruction governing a number of paragraphs of the metal schedule. The merchandise in question was a quantity of partly manufactured raceways for ball bearings which were returned by the appraiser as "finished rings of iron or steel, parts of ball bearings" and assessed for duty at 35 per cent. ad valorem under paragraph 106 of the tariff act of 1913. The importers protested, claiming duty upon the merchandise at the rate of 20 per cent. ad valorem as manufactures of metal not specially provided for under paragraph 167 of the act.

The importation consisted of steel rings in two sizes, invoiced as inner and outer rings, respectively. Grooves had been cut on the outer periphery of the inner rings and on the inside of the outer rings, fitting them to be used as raceways in ball bearings after they have been further ground and finished. The court found the appraiser to be mistaken in his statement that the rings were finished; but it was found that they were so far finished when imported as to indicate their ultimate use and to unfit them commercially for any other use. It was obvious, therefore, that they were unfinished parts and not mere materials for the manufacture of ball bearings. The importers contended that paragraph 106 distinguishes between ball bearings and parts thereof, and that the terms of extension, viz., "finished or unfinished," are expressly made applicable to the provision for ball bearings only and not to that for parts thereof. They argued that this construction indicates a legislative intention to bring entire ball bearings, whether finished or unfinished, within the classification, but not to bring parts of ball bearings therein unless such parts be completely finished as parts. The court said:

> The court inclines to a different construction of the paragraph from that just stated. The phrase "parts thereof," standing alone, is of course incomplete, and its real meaning and application can only be found by construing it in connection with that which precedes it in the sentence. These preceding terms are not "ball bearings" only, but are "ball bearings, * * * finished or unfinished." The meaning of the clause, therefore, is that the prescribed duty shall apply to finished or unfinished ball bearings and also to parts of finished or unfinished ball bearings.

On this reasoning the court affirmed the decision of the Board of General Appraisers and the Treasury Department has issued instructions to collectors at all ports to be guided by this ruling in the assessment of duty on all parts of machinery, devices, etc., similarly provided for in the tariff act. W. L. C.

At the recent annual meeting of the directors of the Novelty Iron Company, Canton, Ohio, officers were elected as follows: President, F. M. Mechling; vice-president, A. S. W. Huffman; treasurer, M. E. Converse; secretary, H. K. Downe; general sales manager, C. M. Converse.

Machinery Markets and News of the Works

With the war demand for machine tools at full flood a note of caution is heard as to the need of greater care in safeguarding orders against the possibility of cancellations should there be an abrupt termination of the European conflict. In opposition to the feeling that the war may end more or less unexpectedly is the fact that large corporations in the United States and Canada are taking immense contracts for the execution of which they are purchasing hundreds of machine tools. Lathe makers have advanced their prices 10 per cent. In New York the American Locomotive Company has bought several hundred lathes. In this city domestic business is larger and more varied. New England tool builders are busy and inquiries are increasing. The volume of small orders is satisfactory in Cleveland, the principal buyers being automobile makers and manufacturers of war materials, and the outlook is better in various directions. March was a satisfactory month in Detroit and purchasing took on a broader aspect. Metal-working lines are active in Milwaukee, though the domestic demand is short of normal. Cincinnati finds that the domestic demand is slowly improving, though lathe and milling-machine makers have orders sufficient for months ahead. Improvement is shown in the Central South. The mine trade is stagnant in the Birmingham district. In St. Louis but little improvement is shown. In Texas manufacturing equipment is in better demand. The machinery trade is gradually becoming normal in the Pacific Northwest, with labor-saving machines in particular request.

New York

NEW YORK, March 31, 1915.

The big feature of the past week has been the heavy buying of machine tools by the American Locomotive Company. Over 100 turret lathes, about 450 engine lathes and other machines which are essential in the manufacture of shrapnel or explosive shells have been purchased by the locomotive company. It is not reported from which country the company received the contract which led to the buying of the tools, nor is it definitely known just where delivery is to be made. It is thought probable that the machines, or a large part of them, will be installed in the plant at Providence where the Alco automobiles and motor trucks were made.

The general demand for machine tools is much better with local dealers. Many of the orders now being received are for purely domestic purposes or at best have but a casual connection with war requirements, although it still is true that the war is the principal stimulus to buying. Automobile manufacturers have continued to be good buyers.

Representative dealers are pursuing a policy of not letting the war demand interfere with proper care of the small buyer, as they realize that in the future the latter will be their mainstay. In the larger transactions which are an outgrowth of the war they are declining to take orders which impose conditions which are considered unfavorable. They realize that one severe loss will nullify a lot of profits.

C. H. Coulier & Co., 50 Church street, New York, are desirous of getting in touch with manufacturers who have 25 or more lathes suitable for shrapnel making.

The International Steel & Ordnance Company has been chartered with a capital of $100,000 by Harry H. Picking, 525 Main street, East Orange, N. J.; Charles O. Geyer and L. Matthews, to make ammunition for large and small arms.

The Reid Ice Cream Company, 524 Waverly avenue, Brooklyn, N. Y., is having plans drawn for a three-story ice plant, 75 x 100 ft., to cost about $50,000. Voss & Lauritzen, 65 DeKalb avenue, Brooklyn, are the architects. The contract has not yet been awarded.

The Buffalo Sled Company, North Tonawanda, N. Y., has purchased the site of the Adamite Abrasive Company's plant, recently destroyed by fire. It will be used for the present as a lumber yard, although the company is in need of an addition to its plant, but has not yet formulated details. J. J. Schneider is president.

The Harrison Mfg. Company, Lockport, N. Y., manufacturer of radiators and accessories for automobiles, is preparing to build an extension to its plant, and will probably let the contract within a few days. It will not require any additional machinery. H. C. Harrison is president.

Henry & Allen, Inc., manufacturer of implements, etc., Auburn, N. Y., states that the recent fire in its agricultural implement plant did not interfere with operations or damage the machinery. It does not contemplate any additional installations for the present. W. J. Henry is president.

The Mignon Wireless Corporation, 127 West Market street, Elmira, N. Y., has been incorporated to manufacture wireless telephone and telegraph apparatus. E. C. Mignon is president; J. G. Gerhart, vice-president, and C. A. Meith, secretary.

The Colonial Electric & Mfg. Company, 14 Lewis street, Oneonta, N. Y., has succeeded to the business of the company of the same name, formerly of Somerville, Mass. It will manufacture electrical toys, motors, etc. F. H. Bresee is president, and J. F. Russell, superintendent.

Feist & Feist, Inc., 738 Broad street, Newark, N. J., has leased a factory to the Klump-Greenfield Company, Newark, for the manufacture of a moving-picture machine. The building is 100 x 112 ft., and has about 20,000 sq. ft. of floor space. Frederich E. Klump is president and Arthur L. Greenfield secretary.

The American Belt Corporation, Rye, N. Y., has been incorporated with a capitalization of $150,000 to manufacture electric leather belts, suspenders, etc. The incorporators are A. M. Reis, Hotel Biltmore, New York; A. Silverstine, 924 West End avenue, and A. A. Alexander, 215 West 101st street, New York City.

The plant of William Barnett & Son, Rensselaer, N. Y., recently destroyed by fire with a loss of $300,000, is to be rebuilt.

An item in *The Iron Age*, issue of March 25, that stated that the Davison-Namack Foundry Company, Ballston Spa, N. Y., had been incorporated, was in error. The Davison-Namack Engine Corporation was the name of the newly incorporated company, which will have its stationary gasoline engine manufactured by the foundry company. There has been no change in the Davison-Namack Foundry Company.

The A. F. Oliver Gear & Machine Company, Buffalo, N. Y., has been incorporated with a capital stock of $20,000 by A. F. Oliver, C. L. Wiedrich and M. S. Gibbs to take over and continue the plant and business of the former unincorporated company of the same name, located at 60 Cherry street.

The Federal Court, Buffalo, has appointed Frederick G. Batcheller receiver for the Buffalo Pitts Company, Buffalo, to succeed Frederick Greiner and John M. Olmsted, appointed about a year ago. Owing to the fact that the company has a large contract on hand and because it is in a favorable condition the new receiver was also authorized to borrow $300,000 to continue the business.

Work was begun last week by the Ferguson Steel & Iron Company upon a manufacturing plant at Churchill street and the New York Central Railroad, Buffalo, for the Curtiss Aeroplane Company. The initial building will be 100 x 300 ft., and of sufficient hight to permit of the construction of the largest aeroplanes. The plant will be of the most modern construction with steel arch roof. As soon as the first building is erected another section of equal size will be added, giving the plant a capacity of 200 machines each month. Eventually the factory will comprise a ground area of 300 x 400 ft. Construction work is to be rushed on account of recent orders from the United States Government of aeroplanes for the army and hydroplanes for the navy.

The Curtiss Aeroplane Company, Hammondsport, N. Y., is negotiating for the establishment of a branch factory at Penn Yan, N. Y., in addition to the extensive new plant it is building at Buffalo, immediate expansion of its manufacturing facilities being required to care for large contracts recently received from the United States Government.

The Winslow Day Company, 430 Court street, Watertown, N. Y., has plans in preparation for the construction of a three-story and basement reinforced concrete storage building, 50 x 152 ft.

The board of trustees of Barker, N. Y., will receive sealed proposals until April 14 for a pump house, pumping apparatus, etc. W. J. Taylor is village clerk. Plans were prepared by Charles C. Hopkins, engineer, Cutler Building, Rochester.

New England

BOSTON, MASS., March 30, 1915.

Domestic inquiries and orders for machinery are not increasing. The volume of war business continues unabated, and its distribution is more general than ever. The great shops that specialize on classes of machinery now in greatest demand, for turning and grinding shrapnel, have passed the limits of extreme capacity, and are calling upon their less busy neighbors for assistance. The result is an even activity among machinery builders and a very general distribution of the profits of this extraordinary business. It seems odd to find a planer shop working full blast on parts of heavy lathes, but the transition from one activity to another is simple enough, after all. The new England foundries are active for the same reason. Much iron is being poured into parts of machines which will make shrapnel, and especially 4½-in. lyddite shells, in the greatest demand at present, but also shells of heavier calibers.

The Bridgeport Hardware Company, Bridgeport, Conn., has begun the construction of an additional building at Iranistan avenue and Admiral street. The structure will be brick, 40 x 133 ft., two stories and basement, of mill construction.

The factory which will be built in New Haven, Conn., by the Kolynos Company, manufacturer of mechanical toys, will be 80 x 120 ft., four stories and basement.

The Union Metallic Cartridge Company, Bridgeport, Conn., has awarded the contract for another building, 64 x 192 ft., two stories, of brick and steel.

Philadelphia

PHILADELPHIA, PA., March 29, 1915.

A permit has been issued to the Link-Belt Company, Hunting Park avenue and the Philadelphia & Reading Railroad, for the construction of a manufacturing building to cost about $3000.

The Ferracute Machine Company, manufacturer of presses and sheet-metal tools, Bridgeton, N. J., has awarded the contract to the Belmont Iron Works, Philadelphia, for the erection of an addition to its plant, 100 ft. square.

The Carpenter Steel Company, Reading, Pa., is extending one of its buildings about 50 ft. It does not plan any other construction at the present time.

The Economy Powder & Products Company, Lafayette Building, Philadelphia, which has purchased about 15 acres at Greenwood, Miss., for the manufacture of pulp, etc., will at once prepare plans for a pulp mill, and will be in the market shortly for boilers, engines, dynamos and a quantity of special machinery. William D. Miller is secretary.

C. P. Schreiner, York, Pa., will receive bids until 1.30 p.m., April 2, for a sewage disposal works and pumping station.

The Utilities Development Company has been organized in Richmond, Va., with $1,000,000 capital stock. J. L. Gossman, Chicago, is secretary.

The Roanoke Iron & Bridge Works, Roanoke, Va., has been incorporated with $125,000 capital stock. O. D. Oakley is president, and N. M. Johnson, secretary.

The Charlottesville Ice Company, Charlottesville, Va., will equip a cold-storage plant.

The Motor Sales & Service Company, 719 Granby street, Norfolk, Va., is in the market for a lathe, drill press, etc., for its automobile repair shop.

Lynchburg, Va., will receive bids until April 6 on centrifugal pumps, transformers, motors, pipe, etc., for an emergency pumping station. H. L. Shaner is city engineer.

White Sulphur Springs, Va., has issued bonds for the purpose of building a water system. W. A. Martin is mayor.

Indianapolis

INDIANAPOLIS, IND., March 29, 1915.

The American Equipment Company, Indianapolis, has changed its name to the S. M. Timberlake Company.

The Merchants Contracting Company, Indianapolis, has been incorporated to generate electricity in isolated plants. The directors are Eugene E. Davis, Carl H. Mote and Charles T. Blizzard.

The Hatfield Electric Company, Indianapolis, manufacturer and dealer in electrical supplies, has been incorporated with $40,000 capital stock. The directors are T. B., C. F., John C., Thos. H. and C. B. Hatfield.

The Champion Trap & Target Company, Indianapolis, has been incorporated by C. A. Young, W. H. Chamberlain and Henry W. Veitmeyer with $25,000 capital stock to manufacture target-throwing machines.

The Indiana Coke & Gas Company, Terre Haute, Ind., has been incorporated with $10,000 capital stock to supply fuel. The directors are Paul U. Bogart, Samuel D. Royse and M. E. Bradley.

The Rex Casket Hardware Company, Newcastle, has been incorporated with $10,000 capital stock to manufacture casket hardware. Howard H. Boar, Harry Burris and William M. Goodwin are the directors.

The James & Meyer Carriage & Wagon Mfg. Company, Lawrenceburg, Ind., is working on three large orders received from England and South Africa.

The Caswell-Runyan Company, manufacturer of cedar chests, and the Schacht Rubber Company, both of Huntington, Ind., are preparing plans for enlargement of their plants.

The Franklin Auto Shoe Company, Pendleton, Ind., has been incorporated with $10,000 capital stock to manufacture non-skid automobile tire shoes. The directors are William and S. W. Featherngill and Thomas M. Hardy.

The Blount Plow Company, Evansville, Ind., has taken options on lands as possible sites for a contemplated new plant to cost $200,000.

The Premier Asphalt Company, Marion, Ind., plans to establish a plant in Louisville. E. V. Uncaper is chief engineer of the company and G. S. Beckwith is manager.

The Lion Acetylene Gas Light Company, Lyons, Ind., recently incorporated, has already installed equipment in leased quarters. Plans for building are not yet formulated. A. G. Kaufman is manager.

The Wabash Cabinet Company, Wabash, Ind., will erect a one-story addition to its factory, 100 ft. long, to be used for its finishing department. No additional machinery will be used. T. F. Vaughn is president.

Detroit

DETROIT, MICH., March 29, 1915.

March is termed a satisfactory month by local machinery merchants. The market throughout the month has been fairly active and sales of standard tools have been of quite good volume. The past week shows a broader market, although locally a major part of the business is coming from the automobile and kindred industries. Scattered sales are reported from other sources. The second-hand machinery market continues rather quiet and most dealers have large stocks on hand. Inquiry is quite brisk, but is confined in the main to requirements for one or two tools. General conditions in manufacturing circles, especially in metal-working lines, are showing an improvement, due in part to war orders although domestic sales are better also. Construction work is reported heavier and some plans for industrial construction are coming out.

The Schlieder Mfg. Company, Detroit, manufacturer of valves, which recently increased its capital stock, has taken preliminary steps towards increasing its facilities by acquiring a large factory site in the northern part of the city.

The Peninsular Smelting Company, Detroit, has been incorporated with $25,000 capital stock to smelt and refine metals. Max Stotter is the principal stockholder.

The Holmes-Howard Motor Company, Detroit, has been incorporated with $5000 capital stock by Rufus B. Holmes, Ray Howard and Harry B. White. It will manufacture motors and machinery.

The Kelsey Wheel Company, Detroit, manufacturer of automobile wheels, has taken out a building permit covering the erection of a one-story factory, 90 x 313 ft., to cost $50,000.

The Sturdevant-Murray Mfg. Company, Detroit, has been incorporated with $25,000 capital stock to manufacture go-carts, etc. Nelson Sturdevant and G. A. Murray are the principal stockholders.

The North American Construction Company, Bay City, Mich., is erecting an addition to its plant, 70 x 100 ft., which with its equipment will represent an investment of $25,000.

The Independent Motors Company, Port Huron, Mich., will increase its capital stock to provide greater working capital and to increase its facilities.

The United Motor Truck Company, Grand Rapids, Mich., has been incorporated with a capital stock of $20,000 by Frank T. Hulswit, E. M. Elliott and H. R. Green. It has

acquired the plant formerly occupied by the Grand Rapids Motor Truck Company.

The Smalley-General Company, Saginaw, Mich., has been incorporated with $10,000 capital stock to manufacture gas engines.

The Pontiac Chassis Company, Pontiac, Mich., has acquired a factory and plans to build an addition. It will be in the market very shortly for various machine tools and equipment. R. A. Palmer is in charge.

The Michigan Engineering Company, formerly located at Detroit, has reincorporated with a capital of $50,000. Its offices will be in Saginaw, Mich. The company manufactures an apparatus for the purification of water for steam boilers.

The Madison Mfg. Company, Muskegon, Mich., manufacturer of boring bars and cutters, has started the erection of its factory.

Chicago

CHICAGO, ILL., March 29, 1915.

Each succeeding week brings some evidence of machine-tool needs of the railroads and a promise of early buying; but thus far no Western roads have issued lists. The Santa Fe has bought a few tools and the Illinois Central and Northwestern roads have indicated some specific requirements. Export orders continue to be received, but locally last week brought out a somewhat lighter business. Shopping at the machinery stores was exceedingly limited. Reports of new construction and new organizations which will be associated with the use of tools are much increased in number as compared with a few months ago. The Schaefer Mfg. Company, Berlin, Wis., is reported in the market for equipment.

Adams Brothers, 3914 Costello avenue, Chicago, Ill., manufacturers of motor cars for railway inspection, have changed their name to the Adams Motor & Mfg. Company. W. E. Adams is president.

The Portable Power Mfg. Company, Chicago, has been organized by I. Karl Davidson, 30 North LaSalle street, Herbert M. Lautmann and T. Behr, to manufacture gasoline engines. The company has a capital stock of $2500.

The Malloydium Company, Chicago, has been incorporated with a capital stock of $100,000 by George W. Ray, Lewis S. Stitts and Alexander M. Rennie, Gary, Ind.

The Warner Forge & Machine Company, Chicago, has been incorporated with a capital stock of $10,000 to operate a forge and machine shop. The incorporators are John L. Pearson, 29 South LaSalle street, Walter D. Herrick and L. M. Brenner.

The Franklin Steel Works, Joliet, Ill., with a plant in Cambridge, Mass., also has decided to open a branch factory in Hamilton for the manufacture of toe calks for horseshoes. Incorporation has been applied for with a capital of $40,000. W. E. Pitcher, of the Franklin Steel Works, Joliet, Ill., will be treasurer and manager.

E. P. Hill, city clerk, Springfield, Ill., will receive bids until 2 p.m., April 12, for one turbo-generator set complete.

The Moore Mfg. Company, Waterloo, Ia., of which E. L. Moore is president, has been organized to build tanks, culverts and portable garages. It is capitalized at $10,000.

The Fogle Pump & Machine Company, Pueblo, Colo., recently incorporated, plans to build a factory, 100 x 120 ft., two stories. It will manufacture irrigation pumps and farm machinery, and will do a general machine shop business. J. Leonard Fogle is president.

Montrose, Colo., has voted $90,000 of bonds for the construction and extension of its waterworks. Bids for this work will be received by P. W. Pinkerton, city manager, about April 1.

The Great Western Sugar Company, Loveland, Colo., is replacing its small evaporators with three larger ones, and is adding cutters, presses, and special equipment at a cost of about $250,000.

Milwaukee

MILWAUKEE, WIS., March 29, 1915.

Activity continues in a great many lines of the metal trades, notably in machine tools, gas engines, motor trucks, automobile parts and farm material; but other lines report a dull and dragging market, with operations only slightly, if at all, improved since January 1. The activity noted is due almost entirely to foreign buying. The domestic demand in all lines, while improved, can hardly be called satisfactory. Consolation is found in the fact that prospects are much better than they have been for many months, and here and there business is maturing at a satisfactory rate. Throughout the State of Wisconsin metal tradesmen report increased activity. The financial position of many concerns is becoming sounder; but banks are still restricting loans, excepting on the choicest security.

The Hans Motor Equipment Company, LaCrosse, Wis., which was financially involved and placed in the hands of D. G. MacMillan as trustee, has been reorganized as the National Gauge & Equipment Company, with a capital stock of $200,000. The shareholdings of Edmund E. and J. H. Hans have been acquired by D. G. MacMillan and Philo M. Gelatt, who will handle the reorganized corporation. The plant is now operating with about 115 skilled workmen, compared with 22 men on October 20, 1914.

The Northern Wood Products Company, Merrill, Wis., recently incorporated, has purchased the plant and business of the Lee Handle & Dowell Company, Merrill, and plans to remodel the works and add some new wood-working equipment. Clinton R. Lee, Lincoln, Neb., is the new president; H. B. White, Spencer, Ind., vice-president, and W. A. Thomas, Merrill, secretary and treasurer. W. E. Helms is retained as factory superintendent.

The Nelson Mfg. Company, Deerfield, Wis., manufacturer of tank heaters and farm equipment, has purchased seven acres, adjoining its plant, and proposes to erect a building, 50 x 200 ft., for manufacturing and storage. N. M. Nelson is president.

The Wisconsin Seating Company, New London, Wis., is installing two large steel punch presses and other equipment for its new cast-steel opera chair department.

The plant and assets of the Gray Iron Company, Beaver Dam, Wis., have been sold at sheriff's sale to Samuel C. Elser, Beaver Dam, representing indorsers of mortgage notes, for $3000. The notes amount to $17,500. The purchasers have made no definite plans; but may undertake to lease the works rather than resume operations on their own account.

The Phoenix International Light Company, Milwaukee, Wis., has changed its corporate style to Phoenix Light Company.

The Railway Materials Company, New York and Chicago, which established a branch plant in the former Wisconsin Central carshops, Stevens Point, Wis., several months ago, has developed a multiple sash weight and plans a large production of the goods in addition to its regular output of brakeshoes.

The Kriesel Motor Company, Spring Valley, Wis., has been incorporated with a capital stock of $25,000 by Rudolph Kriesel and John E. Graele to manufacture engines. Its plans have not yet matured.

The Modern Stamp & Stencil Company, Milwaukee, has been organized with a capital stock of $5000 by Forest L. Adams and Minna G. Bundy.

Articles of incorporation have been filed by the Grand River Telephone Company, Merkesan, Wis. The capital stock is $10,000. The corporators include M. H. Croswell, H. A. Price and C. F. Schrader.

The Mineral Point Public Service Company, Mineral Point, Wis., will add a 500-hp. boiler and a 7000-gal. water-softening plant.

The Car Puller Company, Ladysmith, Wis., is being organized by E. W. Day, B. E. French and Alden J. Laidlaw to manufacture a self-anchoring puller device for automobile use. It is planned to start production at once.

The American Seating Company, Manitowoc, Wis., is reported to be preparing to erect an addition providing 20,000 sq. ft. of floor space.

W. E. Cleveland, Rhinelander, Wis., has purchased additional land for an extension to his boat factory.

Edwin Beaudin has opened a machine shop at Green Bay, Wis., and will install some machinery.

Cleveland

CLEVELAND, OHIO, March 29, 1915.

Dealers are getting a very satisfactory volume of business in small orders. While the demand is quite general, the bulk of the sales are being made to the automobile trade or to companies having war orders. Makers of automobile parts are very busy and some are being crowded for deliveries. An inquiry for a large amount of machinery for making war material has come fom a northern Ohio manufacturer; but there seems to be some uncertainty as to whether this business will be placed. The domestic demand for automatic screw machinery has improved considerably. Orders for screw machine products are coming out in good volume, and one of the leading makers of these products is now running its product department at full capacity. The plants of local builders of automatics and turret lathes are crowded to capacity and portions of their plants are being

run overtime. The outlook in handling and conveying machinery has improved materially. Some good business that has been pending a year or more is about to be placed. Considerable special machinery has been placed in Cleveland recently by Akron tire manufacturers.

The American Shipbuilding Company, Cleveland, will remove its general offices and repair plant now located along the Superior Viaduct to the Globe shipyard site at the foot of West Fifty-fourth street. Three buildings are planned for that site. These are a foundry and machine shop, 120 x 320 ft.; a two-story pattern shop and pattern-storage building, 100 x 200 ft., as well as a three-story office building, 60 x 100 ft. The buildings will be of brick and reinforced concrete.

The National Acme Mfg. Company, Cleveland, Ohio, is having plans prepared for a factory addition. The extension has been under consideration for some time and the company has now decided to go ahead with the work and will place contracts for the building shortly.

Plans for the plant to be erected by the Frantz Premier Mfg. Company, maker of suction cleaners, are being prepared by the Samuel Austion & Son Company, engineer and builder. It will be a four-story fireproof structure, 60 x 250 ft.

The Allyne Ryan Foundry Company, Cleveland, has had plans drawn for a foundry and office building, 80 x 112 ft., to be erected adjoining its present plant at Aetna road and East Ninety-first street. The Forest City Engineering Company, Cleveland, is the architect.

Cleveland, Ohio, will receive bids April 8 for structural steel concrete forms for the West Side waterworks tunnel extensions, and on April 9 for switchboard apparatus and electrically operated high-tension oil switches for a substation of the municipal waterworks plant.

The Electric Auto-lite Company, Toledo, Ohio, will occupy new quarters in the plant of the General Electric Company on Champlain street, Toledo. The plant includes two buildings, one 85 x 304 ft. four stories. An additional building will be erected for the press department. It is stated that the company will continue to use its present plant, the additional space being acquired to provide greater facilities for the manufacture of electric starters, horns and other devices used on automobiles.

The Seneca Wire & Mfg. Company, Fostoria, Ohio, will enlarge its plant by the erection of a two-story building, 100 x 200 ft., to be used for wire-drawing purposes. It is planned to have it ready for occupancy by July 1.

Andrew P. Keller, Tiffin, Ohio, has acquired a site for a machine shop and will erect a building in addition to the two already on the property.

The Fostoria Factories Company, Fostoria, Ohio, recently organized to acquire several unoccupied factory buildings and to secure the location of new industries, has been incorporated with a capital stock of $50,000. J. H. Jones is president, and Earl Ash, secretary-treasurer.

The Republic Stamping & Enameling Company, Canton, Ohio, has increased its capital stock from $1,250,000 to $3,500,000, to provide for taking over the plant of the General Stamping Company, Canton, which the former company recently purchased.

The Turner, Vaughn & Taylor Company, Cuyahoga Falls, has increased its capital stock from $48,000 to $100,000.

The Falls Clutch & Machinery Company, Cuyahoga Falls, Ohio, has increased its capital stock from $1000 to $70,000.

The Fulton Pit Car & Mfg. Company, Canal Fulton, Ohio, has increased its capital stock from $100,000 to $150,000.

The Hoffman Heater Company, Lorain, Ohio, has increased its capital stock from $75,000 to $100,000.

The Case Crane & Engineering Company, Columbus, Ohio, has added a structural steel department. Paul T. Norton is president and general manager.

The board of public affairs, Oxford, Ohio, will receive bids until noon, April 19, for two horizontal-tube boilers, complete.

Cincinnati

CINCINNATI, OHIO, March 29, 1915.

The domestic inquiry for machine tools is improving slowly but steadily. Quite a number of orders have also been received lately. An encouraging feature is the report of several orders from the Pacific coast that have lately been received. The export trade has slackened somewhat, but a sufficient number of orders for lathes and milling machines are in sight to keep all local plants busy until January 1, next. Local firms are nevertheless moving more cautiously in handling export orders, as they are not willing to sacrifice their domestic business for the sake of temporary prosperity. They are also only booking foreign orders contingent on the customer accepting delivery of the machines regardless of the outcome of the war in Europe. An unconfirmed report has been circulated lately indicating that the government of Greece has been inquiring through agents for large quantities of different supplies as well as a number of machine tools for making war munitions.

Several machine-tool builders making machines for which there has been a limited demand are now finishing lathe and milling machine parts for other firms. It is understood, however, that this work was, in most cases, accepted with reluctance, and that the firms in question will soon turn to their regular lines. The second-hand machinery business is dull. Boiler and tank makers also report quiet trade conditions.

The Towle-Cadillac Company, Cincinnati, has had plans prepared for an automobile repair shop that will be erected on Jackson, near Twelfth street. Some light machine-tool equipment will be required.

The Union Distilling Company, Cincinnati, will make further additions to its power plant equipment.

It is reported that the Icy-Hot Bottle Company, Cincinnati, is seeking larger factory quarters and will move its plant from the present location on Second street, at an early date.

The Cullen & Vaughn Company, Hamilton, Ohio, has been awarded contract for a $300,000 public school building to be constructed in Columbus, Ohio, and for which heating and other equipment will be required.

The Recording & Computing Machine Company, Dayton, Ohio, announces the receipt of a large foreign order. Arrangements are under way for increasing the capacity of the company's present plant.

The Dayton Engineering Laboratories Company, Dayton, Ohio, has lately received some large orders and has decided to commence the construction of the addition to its plant, recently mentioned. The proposed building will be 66 x 500 ft., six stories.

The American Seeding Machine Company, Springfield, Ohio, has let contract for a warehouse addition to its plant. No extensions to its manufacturing departments are now contemplated.

The Greenville Electric Light & Power Company, Greenville, Ohio, has increased its capital stock from $155,000 to $180,000, to take care of proposed extensions.

The Cummings Machine Company, Minster, Ohio, has been incorporated with $50,000 capital stock to manufacture concrete mixers and gasoline engines. C. H. Dickman is one of the principal incorporators.

J. S. Everett & Co., Maysville, Ky., have had plans prepared for the erection of a grain elevator, for which special machinery equipment will be required.

The Central South

LOUISVILLE, KY., March 29, 1915.

The month is closing with the machinery business in this territory in much better condition than it has been. The general situation is not only more favorable to business but developments have stimulated demand. Machine-tool manufacturers have been having a good business, the export trade having been exceptionally good. Though part of this is due to the demand for war purposes, one current inquiry being for $17,000 worth of machine tools for shipment to England, the call is also from Australia and other sections where the influence of the war is less in evidence. Wood-working machinery continues to sell fairly well, and the demand for electrical power machinery is good. Small units are selling unusually well.

The Brunswick Creosoting Company, Louisville, which operates a large plant at Brunswick, Ga., has increased its capitalization from $150,000 to $210,000, and is reported to be planning extensions.

The candy factory of Rudolph & Bauer, Louisville, Ky., was damaged by fire last week to the extent of $12,000. A. M. Volz is manager.

The Modern Wood-working Company, 1106 West Main street, Louisville, is in the market for a sander, a tenoner, a saw and other wood-working machinery. Frank L. Hillerich is purchasing agent.

The Hazard Power Company, Hazard, Ky., has been incorporated with $25,000 capital stock by L. L. Stone and J. D. Francis. It is now putting an old plant into operating condition.

W. E. Arnold, Owenton, Ky., who operates a flour mill and electric light plant, plans the installation of a 30-hp. oil engine.

The Floyd Mining Company, Emma, Ky., will establish an electric light plant at Woods, Ky., and will install a boiler, engine, generator and other equipment. Henry L. Coe is in charge.

Tandy Martin, Pine Top, Ky., is reported to have plans for the establishment of a sawmill.

The Norton Iron Works Company, Ashland, Ky., will enlarge its plant and equip for the manufacture of field fencing. The proposed building will be of steel construction, 62 x 132 ft., five stories.

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It is planned by the City Council of Victoria to build a municipal electric light plant to cost about $40,000.

A company, headed by W. A. Parker, Dallas, is being organized for the purpose of constructing an electric light plant at Montague.

The cotton gin of Martin Brothers, Claude, which was recently destroyed by fire, will be rebuilt.

The Texas Power & Light Company, Austin, has adopted plans for an electric light and power plant, which it will build at Palestine, to cost about $83,000.

The International & Great Northern Railroad Company will equip its general shops and division terminals at Palestine with electric power and lights at a cost of about $25,000.

The Pacific Northwest

SEATTLE, WASH., March 23, 1915.

The machinery trade in general is gradually resuming a normal condition. While no large lists of heavy machine tools are appearing, small tools and miscellaneous shop supplies are in fairly active demand. The railroads are holding off, and among other shops handling work of a heavy nature interest is rather in labor-saving devices than in tools of standard types. Although the demand for mill and logging machinery is much less than it has been at times during the last few years, the gradual resumption of operations in the lumber industry is bringing out numerous inquiries for logging engines and boilers, cars and locomotives, tram systems, etc. Inquiries for mining machinery also continue numerous and more interest has lately been manifested in road-building and general contractors' equipment.

H. R. Lemaire, H. C. Christensen and St. Clair Moore, Battle Mountain, Nev., are preparing to build an electric light plant and a small machine shop.

The water department, Seattle, Wash., will receive bids April 2 for two centrifugal or turbine pumps and two motors.

The Strauss Bascule Bridge Company, Chicago, has opened a branch office in the Spalding Building, Portland, under the management of H. L. Wiley.

The Inland Empire Paper Company, Spokane, Wash., has increased its capital stock from $500,000 to $1,000,000, in preparation for the expansion of its operations.

The water system and plant of the Hagerman Valley Water Users' Association, Gooding, Idaho, will be improved and additional machinery installed.

H. H. Knox, Seattle, owning a franchise for an electric light and power plant in Cordova, Alaska, has turned his rights over to a newly organized corporation, known as the Alaska-Electric Consolidated Company. George F. Russell, Seattle; E. L. Terry and De Villo Lewis, Seattle, are the directors. Work on a plant will begin about May 1.

L. M. LaRue, Eugene, Oregon, plans to establish a woodenware factory.

Incorporation articles have been filed in Bellingham, Wash., for the establishment of a canning plant at Nelson Lagoon, Alaska, to cost $150,000. Seattle men are at the head of the company. The directors are E. S. McCord, J. M. Evey, J. A. Shumaker, M. E. Harrah, Seattle, and others.

The new plant of the Brown-Lewis Corporation, Walla Walla, Wash., is nearing completion, and the foundry will be put in operation within 10 days. The new plant is 100 x 600 ft., and will manufacture harvesters, traction engines, disk harrows and gasoline engines. The present company is a reorganization of the Brown-Lewis Mfg. Company, recently bankrupt, and the new plant is the old one rebuilt and improved at a cost of $15,000.

A plant has been opened by Frank Smith, Tenino, Wash., for the manufacture of a patented adjustable clothes drier.

Harry H. Clifford, Kelso, Wash., will build a shingle mill to be equipped with upright shingle machine, with an output of 70,000 shingles daily. The plant will be in operation by April 30.

Eastern Canada

TORONTO, ONT., March 29, 1915.

The report of the Dominion Government regarding transactions of the Canadian banks in February reflects the improvement that is taking place in the business situation in Canada. For the first time in some months loans to commercial houses show an increase, the total being $771,635,208, a gain of $1,516,297 for the month. The total is still, however, $40,000,000 below the figures of a year ago. Another satisfactory feature is the increase of $4,128,000 in savings deposits during the month and of $30,161,000 compared with a year ago. Circulation was $97,789,000, an increase of nearly $600,000 for the month and of $225,410 for the year.

The Canada Iron Foundries, Ltd., Montreal, has been incorporated with capital stock of $4,500,000. The company will take over the iron and steel plants of the Canada Iron Corporation, Ltd., which has been in process of liquidation. The plants are at Midland, Ont., and Three Rivers, Que. Walter R. Lorimer Shanks and Francis G. Bush, Montreal, are the incorporators.

Having received an order for the manufacture of lyddite shells, the Record Foundry & Machine Company, Moncton, N. B., will install new machinery.

The Bell Engine Works, Seaforth, Ont., will install machinery to manufacture shrapnel shells.

The Drednot Motor Truck Company, Ltd., Montreal, have secured a factory at Wellington and Nazareth streets and will install additional machinery.

A cold storage plant is to be erected at Morrisburg, Ont., by R. H. Ashton.

The McQuay Tanning Company, Ltd., Owen Sound, Ont., is to erect an addition to its plant.

The Rideau Power Company, Ltd., Merrickville, Ont., has been incorporated with a capital stock of $80,000. G. F. McKinnon is president.

A new steam engine is to be installed by the Beaver Board Company, Thorold, Ont.

The Port Dover Planing Mills Company, Port Dover, Ont., will install machinery for the manufacture of chairs and furniture frames.

A locomotive and crane with drag-line bucket and other equipment for operating a gravel pit is wanted by John Barbeau, Southend, Ont.

The fertilizer plant of Gunn's, Ltd., St. Clair avenue, West Toronto, has been destroyed by fire with a loss of $40,000. The company will rebuild at once.

The Chatsworth Brick and Tile Company, Chatsworth, Ont., is to construct kilns and will install equipment.

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B. J. Carrico, Ft. Worth, and associates, who were recently granted a franchise for installing an electric light and power plant at Floresville, have organized the Floresville Light & Power Company. The new plant will cost about $13,000.

It is planned by the City Council of Victoria to build a municipal electric light plant to cost about $40,000.

A company, headed by W. A. Parker, Dallas, is being organized for the purpose of constructing an electric light plant at Montague.

The cotton gin of Martin Brothers, Claude, which was recently destroyed by fire, will be rebuilt.

The Texas Power & Light Company, Austin, has adopted plans for an electric light and power plant, which it will build at Palestine, to cost about $83,000.

The International & Great Northern Railroad Company will equip its general shops and division terminals at Palestine with electric power and lights at a cost of about $25,000.

The Pacific Northwest

SEATTLE, WASH., March 23, 1915.

The machinery trade in general is gradually resuming a normal condition. While no large lists of heavy machine tools are appearing, small tools and miscellaneous shop supplies are in fairly active demand. The railroads are holding off, and among other shops handling work of a heavy nature interest is rather in labor-saving devices than in tools of standard types. Although the demand for mill and logging machinery is much less than it has been at times during the last few years, the gradual resumption of operations in the lumber industry is bringing out numerous inquiries for logging engines and boilers, cars and locomotives, tram systems, etc. Inquiries for mining machinery also continue numerous and more interest has lately been manifested in road-building and general contractors' equipment.

H. R. Lemaire, H. C. Christensen and St. Clair Moore, Battle Mountain, Nev., are preparing to build an electric light plant and a small machine shop.

The water department, Seattle, Wash., will receive bids April 2 for two centrifugal or turbine pumps and two motors.

The Strauss Bascule Bridge Company, Chicago, has opened a branch office in the Spalding Building, Portland, under the management of H. L. Wiley.

The Inland Empire Paper Company, Spokane, Wash., has increased its capital stock from $500,000 to $1,000,000, in preparation for the expansion of its operations.

The water system and plant of the Hagerman Valley Water Users' Association, Gooding, Idaho, will be improved and additional machinery installed.

H. H. Knox, Seattle, owning a franchise for an electric light and power plant in Cordova, Alaska, has turned his rights over to a newly organized corporation, known as the Alaska-Electric Consolidated Company. George F. Russell, Seattle; E. L. Terry and De Villo Lewis, Seattle, are the directors. Work on a plant will begin about May 1.

L. M. LaRue, Eugene, Oregon, plans to establish a woodenware factory.

Incorporation articles have been filed in Bellingham, Wash., for the establishment of a canning plant at Nelson Lagoon, Alaska, to cost $150,000. Seattle men are at the head of the company. The directors are E. S. McCord, J. M. Evey, J. A. Shumaker, M. E. Harrah, Seattle, and others.

The new plant of the Brown-Lewis Corporation, Walla Walla, Wash., is nearing completion, and the foundry will be put in operation within 10 days. The new plant is 100 x 600 ft., and will manufacture harvesters, traction engines, disk harrows and gasoline engines. The present company is a reorganization of the Brown-Lewis Mfg. Company, recently bankrupt, and the new plant is the old one rebuilt and improved at a cost of $15,000.

A plant has been opened by Frank Smith, Tenino, Wash., for the manufacture of a patented adjustable clothes drier.

Harry H. Clifford, Kelso, Wash., will build a shingle mill to be equipped with upright shingle machine, with an output of 70,000 shingles daily. The plant will be in operation by April 30.

Eastern Canada

TORONTO, ONT., March 29, 1915.

The report of the Dominion Government regarding transactions of the Canadian banks in February reflects the improvement that is taking place in the business situation in Canada. For the first time in some months loans to commercial houses show an increase, the total being $771,635,208, a gain of $1,516,297 for the month. The total is still, however, $40,000,000 below the figures of a year ago. Another satisfactory feature is the increase of $4,128,000 in savings deposits during the month and of $30,161,000 compared with a year ago. Circulation was $97,789,000, an increase of nearly $600,000 for the month and of $225,410 for the year.

The Canada Iron Foundries, Ltd., Montreal, has been incorporated with capital stock of $4,500,000. The company will take over the iron and steel plants of the Canada Iron Corporation, Ltd., which has been in process of liquidation. The plants are at Midland, Ont., and Three Rivers, Que. Walter R. Lorimer Shanks and Francis G. Bush, Montreal, are the incorporators.

Having received an order for the manufacture of lyddite shells, the Record Foundry & Machine Company, Moncton, N. B., will install new machinery.

The Bell Engine Works, Seaforth, Ont., will install machinery to manufacture shrapnel shells.

The Drednot Motor Truck Company, Ltd., Montreal, have secured a factory at Wellington and Nazareth streets and will install additional machinery.

A cold storage plant is to be erected at Morrisburg, Ont., by R. H. Ashton.

The McQuay Tanning Company, Ltd., Owen Sound, Ont., is to erect an addition to its plant.

The Rideau Power Company, Ltd., Merrickville, Ont., has been incorporated with a capital stock of $80,000. G. F. McKinnon is president.

A new steam engine is to be installed by the Beaver Board Company, Thorold, Ont.

The Port Dover Planing Mills Company, Port Dover, Ont., will install machinery for the manufacture of chairs and furniture frames.

A locomotive and crane with drag-line bucket and other equipment for operating a gravel pit is wanted by John Barbeau, Southend, Ont.

The fertilizer plant of Gunn's, Ltd., St. Clair avenue, West Toronto, has been destroyed by fire with a loss of $40,000. The company will rebuild at once.

The Chatsworth Brick and Tile Company, Chatsworth, Ont., is to construct kilns and will install equipment.

The Hamilton & Toronto Sewer Pipe Company, Ltd., Wentworth street, North, Hamilton, Ont., is in the market for a steam or electric shovel.

Robert Munn, Seaforth, Ont., will purchase machinery for the manufacture of cement, brick and tile at Leadbury, Ont.

The Lebel & Fergues Company, Ltd., 97 Vanhorne avenue, Montreal, is to erect a sash and door factory at an estimated cost of $5500.

The Canada Wire & Cable Company, Montreal, is erecting a plant at Leaside, Toronto, and will remove to that place sometime the coming summer.

The water pumping plant at the Dominion Experimental Station, Fredericton, N. B., recently destroyed by fire, is to be reconstructed. J. H. Grisdale, Ottawa, director of experimental stations, has the matter in hand.

The Dominion Steel Metal Company, Ltd., Hamilton, Ont., is the name of a new company which is to manufacture galvanized sheets. The capital stock is $300,000. American capitalists are behind the enterprise. A. T. Endow, Oshawa, Ont., will be manager.

The Canadian Horse Shoe Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $300,000, to manufacture horse shoes, iron or steel bars and shapes. The incorporators are Guy H. Long, Llewellyn F. Stephens and Hugh J. McKenna. It is the Canadian branch of the United States Horseshoe Company, Erie, Pa.

The Goodison Thresher Company, Ltd., Sarnia, Ont., has been incorporated with a capital stock of $1,000,000 to manufacture threshing and farm machinery. The incorporators are John Goodison, John Cowan, Charles McKenzie, Edwin F. and William T. Goodison.

The Nairn Falls Power & Pulp Company, Ltd., Malbaie, Que., has been incorporated with a capital stock of $100,000 to operate paper and pulp mills. Louis A. Martin, Real Pepin, Laurent G. Morin and William E. Morgan, Montreal, are the incorporators.

The Canadian Westrumite Company, Ltd., Brantford, Ont., has been incorporated with capital stock of $100,000 to manufacture building and paving materials, machinery and tools. The incorporators are William G. Coats, Charles S. Towle, William D. Preston, and Samuel M. Ecclesine, New York City, and William T. Henderson, Brantford, Ont.

The G. M. Chandler Garage & Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of $99,000 to manufacture automobiles. George M. Chandler, William E. Bullen and William H. Broudreau are among the incorporators.

The Sudbury Flour Mills Company, Ltd., Ottawa, has been incorporated with capital stock of $1,000,000 by William C. Perkins, Harold D. McCormick and John P. Hegan.

The Beaver Mica Mfg. Company, Ltd., Ottawa, has been incorporated with capital stock of $50,000 by Pierre H. Chabot, Andrew J. O'Brien, Frederick W. Ward, Charles V. Maxwell and F. W. Bauer.

Knetchel Brothers, Ltd., Southampton, Ont., has been incorporated with a capital stock of $50,000 to manufacture machinery, lumber, furniture, etc. Bertram O. Gordon, Orland, and Solomon Knechtel are the incorporators.

Daly & Morin, Ltd., Lachine, Que., has been incorporated with a capital stock of $500,000 to manufacture window shades, curtain poles and upholstery goods. William J. Daly and Albert Morin, Westmount, Que., and John Shallow, Montreal, are among the incorporators.

The Imperial Rattan Company, Ltd., Stratford, Ont., is building an addition to its chair factory.

S. Anglin & Co., Kingston, Ont., are to rebuild their saw and planing mills, recently destroyed by fire.

The Municipal Concrete Construction Company, Ltd., Berlin, Ont., has been incorporated with a capital stock of $40,000 to manufacture building supplies. Robert J. Gibson, John Callahan and William Miller Geggie, Toronto, are provisional directors.

The foundry and blacksmith shops of Bruce Stewart & Co., Ltd., Charlottetown, P. E. I., have been destroyed by fire, with a loss of $10,000.

The McCormick Mfg. & Supply Company, Ltd., Welland, Ont., has been incorporated with a capital stock of $40,000, to carry on business as brass founders, etc. Frank H. Rice and Melvin Misner, Welland, Charles L. Cooper, Brantford, Ont., and Lewis A. Glessman, Conneautville, Pa., are directors.

The sawmill of Ira Clark, O'Leary, P. E. I., has been destroyed. Loss $4000. It will be rebuilt.

The Mulgrave Power Company, Ltd., Mulgrave, N. S., has been incorporated with a capital stock of $50,000 by Wesley Hattie, Mulgrave, and James A. Clarke, Allen Kennedy and D. McCarty, Sydney, N. S.

Government Purchases

WASHINGTON, D. C., March 29, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until April 20, schedule 8058, for 1 vedette type dirigible airship, with power plant, etc., for Pensacola; schedule 8065, for one electric derrick hoist, for Puget Sound; until April 13, schedule 8085, one high-speed sensitive drill, one portable drill and one radial power feed drill, one two-wheel emery grinder, one portable surface grinder, three screw-cutting lathes, one universal milling machine, and one shaper, all for Brooklyn; until April 20, schedule 8106, one 800-lb. compressed-air hammer, one alligator shear and one thread-cutting machine, all for Brooklyn; until April 27, schedule 8112, one water-tube boiler for Mare Island; schedule 8118, one geared-head lathe for Portsmouth.

Sealed proposals will be received by the lighthouse inspector, 19 Congress street, Boston, until 2 p.m., April 16, for furnishing and delivering one oil engine and air compressor.

The depot quartermaster, United States Army, Washington, D. C., will receive proposals until 11 a.m., April 12, for furnishing 66 electrically-connected portable gasoline electric generating sets. J. B. Houston is quartermaster.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, March 23, for supplies for the navy yards, as follows:

Schedule 7993, Ordnance.

Class 91, Washington—12 bench lathes—Bid 103, $5547; 138, $5615; 153, $7151.60; 176, $4268.80 and $4196.80; 212, $7079.85; 238, $5718; 319, $315.60, item 21.

Schedule 7994, Ordnance.

Class 92, Washington—One 2-ton battery crane truck—Bid 106, $2725.

Schedule 7997, Steam Engineering.

Class 111, Boston—One turbo-generating set—Bid 109, $1751.05; 152, $1360; 268, $969.35; 277, $1271.30; 319, units.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 103, Fairbanks Company; 106, General Vehicle Company; 109, General Electric Company; 138, Hill, Clark & Co.; 152, Kerr Turbine Company; 153, Kemp Machinery Company; 176, Manning, Maxwell & Moore; 212, Pratt & Whitney Company; 238, Swind Machinery Company; 268, B. F. Sturtevant Company; 277, Terry Steam Turbine Company; 319, Westinghouse Electric & Mfg. Company.

Improved Ore-Sintering Apparatus

A patent (U. S. 1,125,125—January 19, 1915) has has been granted to Stephen A. Krom, of Birmingham, Ala., for improvements in sintering apparatus of the pan type in which an ore charge is ignited and sintered and then dumped by tilting the pan. The improvements have as an object the securing of an equalization of draft, uniform ignition and the prevention of the accumulation in the bottom of the pan of fine material falling through the grate bars. For this purpose the pan is constructed with a conical bottom. From the apex of the cone a connection is made by pipe with a tank or receiver; the exhaust fan is connected with the pipe between the receiver and sintering pan. The pan is fitted with an air-tight cover, through which the gas burner tubes extend over the surface of the charge from a main or header outside. For this construction uniform ignition over the surface of the charge is claimed, and the suction is even because it is taken from the apex of the cone bottom. Fine particles of ore falling through the grate are directed by the conical bottom and connecting pipe to the tank or receiver.

The Jones & Laughlin Steel Company has issued the seventeenth edition of its "Useful Information for Business Men, Mechanics and Engineers." It contains in its 672 pages, 2 x 3¼ in., with flexible binding, a wide range of information constantly used by engineers and all connected in a responsible way with works which convert rolled iron and steel into various products. An astonishing amount of data has been packed into small compass. The work is copyrighted.

The Berger Mfg. Company, Canton, Ohio, has reelected as directors Edward A. Langenbach, Charles **Kreig, H. R. Jones, Albert Hochwalt and R. H. Yaneey.**

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

TANKS AS "STRUCTURES."—An iron tank in course of construction is a "structure," within the requirement of the Ohio labor law, which makes it the duty of employers to provide safe appliances for the use of workmen engaged in the erection of any "house, building or other structure." (United States Circuit Court of Appeals, Sixth Circuit, Standard Boiler & Plate Iron Company vs. McWeeny, 218 Federal Reporter 361.)

MISUNDERSTANDING AS TO PRICE OF GOODS.—Plaintiff contracted to sell goods to defendants, but through misunderstanding there was no meeting of minds as to the price. Before the goods were delivered defendants ascertained from invoices that plaintiff claimed a higher price than they had in mind, but accepted and used the goods before there was any adjustment of the misunderstanding. Held, that defendants thereby rendered themselves liable for the invoice price. But where it is shown that there was a clear understanding between the parties as to the price, the buyer's acceptance of delivery does not prevent him from showing what the agreed price was, and thus limit recovery by the seller to that amount. (Kentucky Court of Appeals, Caldwell & Drake vs. Cunningham, 172 Southwestern Reporter 498.)

PROTECTION OF INDIVIDUAL NAME AS TRADEMARK.—When a patented device comes to be known by the public under the name of the patentee, there can be no monopoly of the right to use that name after expiration of the patent, but other manufacturers cannot adopt the same name as the manufacturer under the patent—a name other than that of the patentee—where such use would operate to deceive the public as to the origin of a competing product. (Tennessee Supreme Court, Sanford-Day Iron Works vs. Enterprise Foundry & Machine Works, 172 Southwestern Reporter 537.)

EXCESSIVENESS OF PERSONAL INJURY VERDICT.—The amount of $9850 was excessive recovery for injury to a laborer employed in a machinery manufacturing plant, and must be reduced to $7000, though it appears that the femur of his right leg and his right shoulder were fractured, and the leg was thereby shortened an inch. (Minnesota Supreme Court, Quinn vs. St. Paul Boiler & Mfg. Company, 150 Northwestern Reporter 919.)

SCOPE OF WISCONSIN COMPENSATION ACT.—The Wisconsin compensation act does not authorize an award for death of an employee killed by a stroke of lightning while at work. To be subject to compensation, the injury must not only occur in the course of employment but must be the result of some condition growing out of the employment. (Wisconsin Supreme Court, Hoenig vs. Industrial Commission of Wisconsin, 150 Northwestern Reporter 996.)

SHIPMENTS TO SHIPPER'S ORDER.—When machinery contracted to be sold is shipped by the seller to his order with instructions to the delivering railroad company to notify the buyer, and delivery is made without surrender of the bill of lading attached to a draft on the buyer, the railroad company is entitled to recover possession of the freight or sue for its value unless the buyer procures and surrenders the bill of lading. Under such a shipment neither the seller nor buyer is entitled to deliver without surrender of the bill. (Arkansas Supreme Court, Tedford Auto Company vs. Chicago, Rock Island & Pacific Railway Company, 172 Southwestern Reporter 1006.)

LEGAL PHASES OF SALES CONTRACTS.—A contract to sell goods is not enforceable by either party if it does not provide for the delivery of a definite quantity. This does not mean, however, that an agreement to buy all of a certain kind of articles used by the buyer in his business is invalid; in such case the quantity is made definite by ascertaining the buyer's requirements. If the contract leaves it open to the seller to refuse to deliver any quantity, or to the buyer to reject any delivery, then the agreement is so one-sided as not to be legally enforceable. An express provision in a contract of sale cannot be contradicted by one of the parties by showing a trade custom at variance with that provision. But, although a contract be originally unenforceable for indefiniteness as to the quantity of goods to be delivered, acceptance of orders given by the buyer thereunder constitutes a binding agreement between the parties as to the quantity ordered, without any obligation between the parties beyond the terms of the accepted order. (Maryland Court of Appeals, Parks vs. Griffith & Boyd, 91 Atlantic Reporter 581.) An agreement for a sale of a given quantity of articles to be shipped within a certain period under different deliveries implies an option in the buyer to order out installments within that time, but requires him to furnish orders for the full amount before expiration of the period fixed by the contract. Failure to do this constitutes a breach on the buyer's part, but the default is waived by the seller's act in entering into a new contract extending the time for deliveries. When the subject of sale remains unidentified in the seller's hands, so that title has not passed to the buyer, the seller cannot maintain suit to recover the purchase price on the buyer failing to order shipment within the time fixed by the contract. His remedy is a claim for damages for breach of the agreement on the buyer's part. (Maine Supreme Judicial Court, Russell vs. Clark, 91 Atlantic Reporter 602.)

NEGLIGENCE INFERRED FROM DEFECT IN FLASK.—Where a flask, breaking or leaking of which caused injury to a foundry employee by permitting molten iron to flow upon him, was practically new, negligence in failing to provide him with a reasonably safe appliance may be inferred from the mere happening of the accident. (Alabama Court of Appeals, Lawler vs. Birmingham Stove & Range Company, 66 Southern Reporter 897.)

EMPLOYER'S LIABILITY FOR AGGRAVATION OF INJURY.—Although an employee injured in the course of his employment cannot hold his employer liable so far as the injuries have been aggravated by careless failure to have his wounds properly cared for, the employer's liability is not affected by unskillful treatment by a surgeon, if the injured worker used a reasonable degree of care to secure a competent doctor. (Indiana Supreme Court, Suelzer vs. Carpenter, 107 Northeastern Reporter 467.)

METHODS OF COMPETITION WHICH ARE NOT ACTIONABLE.—A manufacturer is not entitled to enjoin a competitor from using certain unpatented machines and methods, knowledge of which was acquired from former employees of the complaining manufacturer, unless such machines and methods were used by the latter secretly, and disclosing employees knew that fact. The trade-name New Idea, as applied to a device, is not infringed by use of the name New Departure by a competing manufacturer, where the two products differ in general appearance and each bears the name of its manufacturer. It is not actionable unfair competition for a manufacturer to copy matter from a rival's catalogue, where it is not copyrighted and relates to articles which both have an equal right to sell (United States District Court for the Western District of Michigan, Hamilton Mfg. Company vs. Tubbs Mfg. Company, 216 Federal Reporter 401.)

DAMAGES RECOVERABLE FOR BREACH BY BUYER.—Ordinarily, the damages recoverable for breach of a buyer's contract to receive a quantity of iron ore is the excess of the contract price above the market value of the ore at the time and place when and where delivery was to be made under the contract. The seller is not entitled to recover the amount of any additional profit which would have resulted from the completed sale, unless the buyer knew when the contract was entered into that such loss would result to the seller from breach of the agreement. (Samuel vs. de la Sota, 54 Pennsylvania Superior Court Reports 1.)

EMPLOYER'S LIABILITY FOR DEFECTIVE CHISEL.—A machinist or other employee engaged in using a cold chisel may assume that it is reasonably safe without necessarily accepting the risk of having a particle of it fly into his eye, unless any defect in the tool is so obvious that it would have been discovered by the employee in the exercise of a reasonable degree of care for his own safety. (Kansas Supreme Court, Brooks vs. Kansas Chemical Company, 145 Pacific Reporter 840.)

Trade Publications

Punching and Shearing Machinery.—Huntington Machine & Foundry Company, Huntington, Ind. Catalogue. Embodies a brief general description of a line of punching and shearing machinery and bending and straightening rolls with a list of the capacities of the standard punching and shearing machines and illustrations of the entire line. Apart from the general description at the beginning, there is practically no text in the catalogue, views of the machines being relied upon to tell the story.

Gasoline Engines.—A. W. Gray's Sons, Middletown Springs, Vt. Catalogue No. 15. Pertains to a line of horizontal gasoline engines that are built in either the stationary or portable type, in sizes ranging from 1 to 18 hp. Illustrations of the engines are presented with brief text descriptions. The various parts of the engines are shown, and a condensed table of specifications is included.

Foundry Supplies.—Sterling Wheelbarrow Company, Milwaukee, Wis. Catalogue No. 24. Illustrates a line of foundry supplies, including wheelbarrows for handling pig iron, coal, coke, etc., charging carts, trucks, foundry flasks, shop and sprue boxes, core oven trucks, etc. All of the various styles of flasks, which are made in rectangular and round forms, are illustrated, with brief descriptions and tables of the sizes, styles and weights that can be furnished are included.

Steel Pipe.—Stewarts & Lloyds, Ltd., 41 Oswald street, Glasgow, Scotland. Pamphlet. Describes and illustrates the use of a line of steel pipe for water, gas, sewage, etc. The description is supplemented by illustrations of installations and the various fittings. Data on the cost of laying steel pipe, the making of branch service connections, external and internal corrosion and the use of steel and cast-iron pipe are presented. The standard specification for lap-welded steel pipe, and a number of illustrations of the products of the company are included.

Grinding Wheels.—Norton Company, Worcester, Mass. Calendar. This calendar is of the three-month variety, each leaf containing a calendar for the past, present and following month. On each leaf of the calendar, which runs from April 1, 1915, to March 31, 1916, are printed the trademarks of the company's two grades of grinding wheels, Alundum and Crystolon and the trademark of the company in two colors.

Internal Combustion Engines.—Grand Rapids Gas Engine & Yacht Company, Grand Rapids, Mich. Catalogue No. 11. Deals with a line of marine and stationary internal combustion engines, using gasoline, petrol, kerosene and paraffine as fuel. Illustrations of the different types of engines that are built are presented with brief descriptions, and this is supplemented by descriptions of the various parts and accessories with illustrations. Tables of dimensions of the several sizes of engines, which will develop from 5 to 160 hp., are included.

Electric Fans and Lighting Conduit.—Sprague Electric Works of the General Electric Company, 527 West Thirty-fourth street, New York City. Two pamphlets. The first, No. B-3330, treats of a line of electric fans for use with either direct or alternating current. These fans are built in all the standard types for desk, ceiling and column use, in either oscillating or stationary styles. All of the different types are illustrated, with brief tables of the sizes, voltages and speeds for which they can be supplied. The other booklet, No. 438, contains a list of the various sizes of conduit, couplings and elbows that can be used for running electric lighting circuits. A description of the conduit, which is made from soft mild steel and enameled, both internally and externally, is included, with a partial list of the buildings on which it has been used.

Heaters, Forges and Furnaces.—Monarch Engineering & Mfg. Company, 1206 American Building, Baltimore, Md. Series of pamphlets. Gives illustrations and brief descriptions of a line of portable heaters, furnaces and forges, using oil, gas, coke, coal, or charcoal, as fuel. Line drawings, showing the construction of the various pieces of apparatus, and views of installations are included.

Oil Engines.—National Steam Pump Company, Upper Sandusky, Ohio. Pamphlet. Describes an internal combustion engine using oil as fuel in which there are only three reciprocating parts, and the governor and the fuel pump, which are the only mechanically operated attachments, are simple and automatic. The engines, which are made in both vertical and horizontal types, are described at some length with illustrations of the various parts to supplement the text description. A sectional view of the horizontal engine, showing the distinguishing features, and instructions on the operation of both styles of engine are included.

Chucks.—E. Horton & Son Company, Windsor Locks, Conn . Catalogue No. 12-C. Lists a line of chucks of the independent jaw, universal, lathe, combination, carwheel and milling machine types. A separate page is given to each style of chuck with an illustration, brief description and table of the sizes in which it can be furnished. Mention is also made of several kinds of drilling machine chucks. Among the types shown is a combination geared scroll chuck that was illustrated in *The Iron Age*, December 3, 1914.

Rock Crushing Machinery.—Traylor Engineering & Mfg. Company, 30 Church street, New York City. Catalogue No. G2. Calls attention to a line of rock crushing machinery and complete plants for crushing stone and rock. The crushers covered are of the gyratory, jaw and roll types, all of which are illustrated and briefly described, sectional views and specification tables being also presented. Mention is made of screens and a diagram is presented showing the proportion of product which will pass through different sizes of perforations. Dimension tables of the different sizes of gyratory crusher are included, together with drawings of various typical plants.

Machinists' Supplies.—Whitman & Barnes Mfg. Company, Akron, Ohio. Catalogue No. 86. Size, 6 x 9 in.; pages, 170. Supersedes all previous catalogues and relates to a line of machinists' small tools which includes twist drills, reamers, drop forged and special wrenches, spring cotters and flat spring and riveted keys. The catalogue is divided into sections covering each of the separate lines with a brief introduction. Lists and illustrations of the different types of tools are presented, and in connection with the drills and reamers which are made from both carbon and high speed steel, the prices of the two materials are printed in different colors, so as to furnish a ready means of comparison. A number of tables of useful information and directions for grinding drills and ordering special drills and reamers are included.

Autogenous Welding.—Oxweld Acetylene Company, Thirty-sixth street and Jasper place, Chicago, Ill. Catalogue sections Nos. 1, 2, 3, 4, 5 and 6. Concerned with oxy-acetylene welding and cutting of metals and the apparatus used. After a discussion of the field covered, illustrated descriptions are presented of portable and stationary generators, blowpipes, pressure regulators, etc. Illustrations of the outfit in actual use are also included.

Concrete Mixer.—Standard Scale & Supply Company, 243 Water street, Pittsburgh, Pa. Bulletin No. Y-90. Pertains to a low charging type of concrete mixer. The various styles of mixer are illustrated with a description of the special distinguishing points. A number of views of the mixers in use are presented, followed by a description of the design and a table of the sizes, capacities, weights, etc. Mention is also made of block machines, hoists, pumps and wheelbarrows and carts that are used in connection with the mixers.

Core Drill.—Triangular Tool Company, Erie, Pa. Circular. Describes a core drill for extracting coupons for tensile and bending tests from steel bars. This drill can be used with all grades of steel and will core out a piece without it being necessary to withdraw the tool to clean out the chips. An illustrated description of the drill appeared in *The Iron Age*, November 26, 1914.

Grinding Machines.—Chas. H. Besly Co., 118 North Clinton street, Chicago, Ill. Booklet. Relates to a vertical-spindle machine using a disc wheel 53 in. in diameter for grinding and flatting large work having a comparatively small area of finished surface. A number of views of the machine in use in plants are presented as well as a detailed description of the machine and its accessories.

Sheet Metal Working Machinery.—Niagara Machine & Tool Works, 639 Northland avenue, Buffalo, N. Y. Two catalogues. The first, No. 50, deals with a line of tools and machines for sheet metal, including folders and brakes; beading, flanging, grooving and double seaming machines; forming rolls, elbow and pipe tools, shearing machines of various types, presses, punching machines and hand tools. All of the lines are illustrated with brief descriptions and tables of the sizes in which they can be furnished. The other catalogue, No. 51, treats of presses of all types. A brief description of some of the special features common to all such as the clutch which is furnished in the automatic jaw type and in combination with a brake are briefly described, followed by descriptions of the several series, a view and brief description of a typical press of each being presented with tables giving the principal dimensions of the other machines of the group.

Mechanical Stokers.—Wetzel Mechanical Stoker Company, Trenton, N. J. Booklet and folder. The former describes by illustrations and diagrams the Wetzel system of coking coal before the fuel reaches the firebed to secure smokeless combustion. Diagrams of the stoker, showing its application to boilers of various types with ash and coal handling appliances are included. Mechanical stokers in general receive some attention and the stoking problem is discussed from several angles. The folder contains illustrations of installations only.

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